THE

SOUTHERN AGRICULTURIST.

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PART I.

ORIGINAL CORRESPONDENCE.

ART. I.—*On the General Management on a Plantation in the Middle Country: by* A PLANTER.

(Continued from page 284.)

Dear Sir,—IN my last number on the winter and spring praparation for a crop of cotton and corn, all the cotton and corn stalks and every thing else that had grown on the land the preceding year, were required to be placed immediately under the crop to be now grown, to act as a manure for it, and covered early in the year, that it might be well rotted, so as to act with most effect; and all the surface of the fields bared of their coverings, and exposed to the meliorating influences of the winter's frosts. You are required to bed for cotton, a part with your hoes, a part with your ploughs and harrows, and your light lands to have prepared for flush planting. These things being all done, commence planting early in April on the different soils as follows: on the stiff lands, or such as you expect much difficulty in getting a good rise from, open trenches with an indigo drill, (a small plough with a broad board bottom having a keel on it)* which smooths the top of the bed, and makes a trench from two to three inches deep, the

* A description of this Drill Plough is given in Gen. Williams' practical communication in your 2d volume.

mule walks on the top of the bed, and opens from ten to fifteen acres a-day; the seed is scattered by two labourers to each drill as thick as three, four and five bushels to the acre; your light lands may be opened in the same way, but I would prefer to chop holes in the beds with the hoe, as it makes the thinning of the cotton more easy, and much less seed necessary, one or two bushels to the acre being sufficient; or you may open holes at regular distances by cogs on a round log or block hollowed out in its centre, and placed between two shafts and drawn by one mule, walking on the top of the beds. Of the various methods, I prefer the drill in stiff and the hoe in light sands, but whether you plant in the drill or in the chop, I would cover with the covering board or board-rake, (a simple but most efficient instrument made by nailing a board long enough to rest on the tops of two beds at a time, across the ends of two shafts or poles,) the mule walks in the alleys, covers two rows at a time, and from 20 to 30 acres a-day; the man presses on the handles, so as to cover deep or shallow as you desire.* One shall be deposited in the model office at Columbia, where it is desirable that Agricultural Societies, or public spirited individuals should send for general benefit any plough, hoe, or other agricultural implement they may think well of. Where your lands are light but have been recently cleared, and are full of stumps, a heavy board or oak piece two feet long, the two front corners rounded off, nailed to the bottom of any plough-beam, answers the purpose better. The cotton coverers mash small clods, press the earth hard on the seed and level the surface, and are decidedly better than any hand rake. If the land be stiff there must be about fourteen, five inch spikes driven in three rows, four inches from each other, to show about three inches below the board, and at such distances on the boards as the cotton rows are from each other, so that whatever irregularities there may be in their distances, the spikes occu

* The Cotton Coverer is made by nailing an inch-board 9, 10 or 11 inches wide and four feet long across and at the bottom of two poles, through which poles, a round is put to answer for a swingle tree bar, and to which is attached the mule with the ordinary plough-geer. Two plough handles are nailed on the shafts and supported by an upright exactly as for a common plough. The spikes are 4 or 5 inches long in three rows, 3 inches apart, and 4 inches from each other, and are nailed in such parts of the board as correspond with the average width of your rows, so that it will answer for 3 and 5 feet and all intermediate distances.

oying the space of about twenty inches will be sure to find the tops of the beds, make them fine and cover the cotton with earth. If your lands are out of order when you plant, you may defer covering the seeds until a rain, and then a large crop may be covered in two days. Your seed may be planted dry, or rubbed, or with the wool singed off by fire, and all do well. I prefer to continue the old practice of rubbing, as it enables you to scatter the seeds with more regularity and more expedition.

I will now mention some of the difficulties I have met with in getting a good rise or "stand" of cotton, and the best remedies I know for them. On the stiff lands a hard rain after planting has often run the land together and cemented the earth so closely over the drill, that the cotton has been unable after germinating to force its way up, the most expeditious remedy for this, and for its expedition the best, is to run the board rake (or spiked cotton coverer) over the beds twice, which will crack the surface and enable it to rise; or you may short chop with the hoe very close to the drill. The rain you plant with will seldom give you a rise on stiff or cold lands—your covers, (now to act as crust crackers) must be ready to go soon after a rain and before the land hardens too much, and where they kill one plant that may be up, they will raise a hundred that might not have come up without them. Suppose your cotton up well, it may have to contend with the cutworm, or cabbage-worm, the ant, the louse, and the sore-shin;—the remedy for the first is to thin but little and to shave all the earth from the plants, and leave the grass or weeds in the alleys uncut for their use: pepper grass is particularly favourable to their generation. I have seen the cotton on acres (where their effects were not visible) destroyed in a few days after being cleaned by the hoe and plough. Common sense and experience dictate, that where they have nothing else to eat, they will eat the cotton. I have never seen much injury done by them after the middle of June, as very hot weather gets us rid of them. The ant is an evil of the lighter lands, and the best remedy is to disturb them often by drawing the earth to the plant, and making up in the vigour of its growth for the retardation from their injuries; where they eat all but the bare pole, your chance is a bad one, but where the small leaf at the top remains, the plant

will come out. The louse is a green coloured insc t that covers the under side of the leaf, and curls it downward, I should do the same to them, and with the same view. The sore-shin is a disease common to the plant under any circumstances, but is increased much by the bruising of the stem against the ground from the whipping winds,—think what injuries would be done by wind to the handle of an open umbrella stuck in the earth, and I know nothing that it more resembles than young cotton; you should prevent its shaking and bruising by drawing earth up to the stem, so high as to steady the plant. The ant, the louse and the sore-shin should not prevent your thinning so far as the growing of the plants requires it:—otherwise with the cut-worm.

Where you apprehend no serious injuries to your cotton, the first work is to thin a little, and either to draw earth to the stem or from the stem,—the former decidedly the best, as it preserves the plant better and advances its growth more, you should resort to the latter, therefore, only where much grass has come up in the drills or on the beds, or where the lands are hard, and the beds out of order, in the one case as the best means of getting rid of the grass, and giving the opportunity to see that it is well done, and in the other, as enabling you to put your lands in better order with the plough or harrow. Lands so hard as to break into large clods, will plough up fine without rain if the plough immediately follows a deep shave off with the hoe. The second hoeing is the most important one, the productiveness of the crop very much depends on its being done well and early, and it requires more of the judgment of the planter than any other, it may be done in many ways, of which I will mention a few, that you may make the selection of such as your soil and other circumstances may make most suitable. Your object now is to get your cotton thinned to stalks standing singly, freed from grass, and earthed up early so as to push its growth, and the labour of doing so is great. You must keep this steadily in view, and adapt your work to its obtainment; if grassy shave lightly off with the hoe wide enough for a small mould board plough to pass on the clean earth, and mould or put the earth to the stems of the plant, this gains your object, and the acre is easily completed in the day; or if not grassy, you may

thin and earth with the hoe, by chopping through the width of the hoe in the drilled cotton, and leaving two stalks, or thin the chop cotton by hand and earth with the hoe, after two cuts of a mould board plough, and one of a broad shovel, or after two cuts of a skim plough, or two cuts of a harrow, or three cuts of the shovel, or indeed any plough, and I should be guided in my own choice of them by the following summary of their general merits—the skims on light lands in a dry time have the advantage of carrying a wider furrow, cutting nearer to the plant, preserving both the shape of the bed and more completely cutting all the growth on the surface;—harrows smother grass and leave too much uncut, but are to be preferred to all ploughs in stiff lands as they pulverise better and do not make clods, and there is no ground too hard for them;—in wet weather and in light and grassy grounds, mould board ploughs that turn the surface down, and give a clean surface for the hoes to draw the earth from, to the cotton, are to be preferred, and such are best as turn the widest furrow slice,—the great objection to the skimmer is that it leaves the grass where it was cut, and where it may be revived by an early rain: with these obvious differences in the mode of work of some of the common ploughs in use, you will be able to decide on which to use;—you should keep in readiness a supply of all. It is the poorest economy to be scant in good implements, the difference in the effect of three days work in the crop, may pay for them all. The second working may be gotten through also, very expeditiously on light lands, free from grass, by earthing the plants with two cuts of a small mould board plough, with the mould board to the cotton, and throwing the dirt up to the leaf, the labourers not using the hoe but following immediately behind thinning, relieving such as were too much covered, and putting the dirt with the fingers to such as were not sufficiently covered: one and a half, or indeed, two acres may be done by each labourer per day, it requires good ploughing and it is hard work to the labourer, and should be resorted to only occasionally:—or on lands in a similar situation where the cotton has been already thinned, draw only one side of every bed with the hoe, and you can do an acre and a half with more ease than one acre, and draw both sides. On light lands in good order, this work looks so well, I cannot doubt that

the cotton has received all the benefit of any other mode of working. I am at the moment of penning this epistle to you, doing this work in the field, and it looks well. I have thus tried to give you, various ways in which the second hoeing may be gotten through with; your own good sense and observation will be able to use one or the other of them in the third and other workings of your crop, premising that after the second working it will not be prudent to plough so near to the cotton as some of these methods may require.

About the 1st of August, or so soon as the cotton has reached the size that the land ought to give it, top it, by nipping off the bud, and not breaking off the germ of two limbs as is more usual. There is some judgment to be exercised in knowing when to top; if the plant is in full growth of deep green, the leaves large, and the weather rainy, delay it, as it is apt to push out longer suckers which rob the bowls of their supply of sap, unless they are removed, which is tedious though valuable. As a general rule, I would top whenever the season was so far advanced as to make it probable, that there would not be time for the stalk to grow taller, and from the new wood, push out a limb, and that limb bear a pod in time to open before the frost, which with us is, generally from the 1st to the 10th of August. I have toped as early as the 18th of July and as late as the 25th of August. Our frosts are generally about the middle of October. From the blossom to the open bowl, takes about seven weeks in the early, about five weeks in the later part of the season, and perhaps, not more than one bloom in a dozen makes an open bowl. I consider topping valuable in poor as well as rich lands, the object being to turn that sap into the bowls that might otherwise go into a growth that could not bear fruit in time. To cut off water sprouts, and to break off the suckers is tedious but very profitable work. The limit of my paper bids me not say more, I fear I have already said enough to tire you and all who may read this.

A PLANTER.

ART. II.—*The System of Horizontal Ploughing defended, and the objections urged against it, by Messrs.* WILLIAM ELLISON *and* D. P. HILLHOUSE, *considered and replied to; by* ELDRED SIMKINS, Sen.

Cedar fields, near Edgefield Village, 28th April, 1830.

Dear Sir,—I have read with attention and profit several notices of a system of horizontal ploughing, remarked upon by me in your number for September last. General Joor, of Mississippi, Mr. Herbemont, of Columbia, Mr. Watts, of Edgefield, and perhaps one or two other gentlement approved of the plan. Mr. D. P. Hillhouse, of Washington, (Geo.) in the (otherwise) sound and practical "Outline of agriculture," pursued by him, condemns it, and Mr. William Ellison, of Fairfield, seems to get a-straddle of the proposition, neither positively condemning, or directly approving the system. The latter gentleman sets out by asserting that *you*, Mr. Editor, are mistaken in attributing "the great emigration from this state" to a neglect of horizontal ploughing and "the destructive system of culture, which has prevailed generally."* That these are not the *causes* of emigration, but the *effect* of a disposition to emigrate, and that you have, therefore, mistaken the cause, for the effect. Now rearly I cannot perceive that it is very important to settle this *knotty* point, since the great evil to be remedied, is the prevalent bad culture, and the good to be gained, is the substitution of a better system for it. But if Mr. Ellison will permit it, I must still express my belief that you were mainly right, and that you had not mistaken the cause for the effect. Now, I admit, that there are some wanderers, some restless people, who with a roaming disposition and a fondness for frontier settlements, are always ready to strike camp and move as fast as the country they are in, fills up—such are always in pursuit of the Elysian fields, cheap lands, and golden prospects, which Mr. Ellison describes; but I ask if this is the case with the great bulk of settlers who occupy any country? Surely not: the nature of most men as they settle down, make improvements, clear land, form acquaintances, make friends, and become identified with a country, its laws, manners, customs, and a thousand associations, is, to wish to accumu-

* This opinion was advanced by the Editor pro tem. and not by the Editor.

late property and become permanent. Thus they live indulging in the careless and destructive cultivation of their lands, till with increased, and increasing families, and worn out lands, they are brought to the unpleasant alternative of living in poverty, or seeking fresh lands, in a newer country. I admit that there are exceptions, to the rule, but in four cases out of five, perhaps nine out of ten, it causes a painful struggle in families to be compelled to abandon their old homes, fire-sides, friends, and connexions, which from habit and many endeared associations had become identified with their happiness, to seek homes in a wilderness. If, therefore, the question be one of any importance to be decided, I must believe you were correct as to the *cause* of most of the emigrations from our state.

Mr. Ellison, as if to deprive some one of the credit of novelty, which I am sure was not pretended to by me, says "this practice of horizontal ploughing is not a novelty in this State. It has been practised for years in some places, and eventually abandoned." "I saw" continues Mr. Ellison, "some attempts in that way, about ten years ago, in Edgefield, and a Mr. Mobley of this district, practised it for years, and I am informed has abandoned it as useless." Now, surely he would not explode the plan because he once saw some *attempts* in that way in Edgefield, and because Mr. Mobley tried, and abandoned it—if he will do us the favour again to visit Edgefield, we should be gratified to shew him several successful attempts at horizontal ploughing where the level of the ground is accurately taken; and hundreds of instances where the plan has been partially adopted. I mean by ploughing across the hills, directed only by the eye, and I have not as yet heard of any having abandoned it. But it would be by no means strange or discouraging, if some persons were to abandon it. There are some of such changeable and eccentric dispositions, who striking out into new plans on theory, have no sufficient settled purpose, to give any important plan a fair trial. There are others who not being able to perfect a plan *at once*, become easily discouraged, and abandon their purpose; and there are still others who fail by the defeat of their own judgments, or their ploughs and other agricultural utensils. It is possible Mr. Mobley may have fallen among some of one of these classes.

But Mr. Ellison still objects to horizontal ploughing in this State, because of "the exceedingly irregular surface of the country." Now this is the very reason why it is rendered necessary, for surely no one would think of it in a level country, or of abandoning it when undertaken, because nature had not made the hills regularly round, or with a smooth surface. If the hills were so, there would be no short rows, and but little room for the exercise of ingenuity in perfecting the plan—all must know, that there are, and ever will be, difficulties and objections to every important work, or enterprize, and if the reader will advert to my remarks in the September number of last year, he will find that I was very far from assuming that this system of cultivating hilly land, was free from objections.

It is amusing to see with what address Mr. Ellison justifies the success of Gen. Joor's plan of ploughing, near Natchez, on the Mississippi, and its failure here, because of the different shapes or formations of the hills. *There*, he supposes them more regular, and therefore, the plan succeeds, *here* the hills are sharper and more regular, and therefore, the plan cannot succeed.* Now if these are facts, which I never heard suggested before, they would only prove that the plan was more easy *there* than *here*, nor would it form a conclusive objection that some of our hills are so irregular, that in "tracing a horizontal line of any length, you would in many situations be obliged to veer to every point of the compass." This would only show that the ploughing would be more difficult in such situations, but would neither prove the plan impracticable, or that much of the fertility of the land could not be saved by it. Where hills are so very sudden, abrupt, and precipitous as to render the passage of the plough difficult, my advice would be not to clear or cultivate at all, but to preserve such places for the production of fire-wood and timber.

Far from attempting to compete with Mr. Ellison in geological knowledge, I will not follow him into his analysis about the indications of great irregularities where granite appears near the surface, and wherein he seems to infer that "the middle country is more broken than any part of

* Vide Mr. Ellison's Treat. April Number, p. 179.

the State from the above cause, added to the narrowness of the dividing ridges." Now, my observations, (if I understand him,) is directly contrary to his theory, for I have observed granite, generally speaking, near the surface and in far greater quantities in the upper country, even verging on the mountains, than in the middle country. Be this as it may, I am gratified to find that Mr. Ellison, "influenced by a desire to effect this object, (the preservation of broken lands) has, notwithstanding the discouraging opinions of others, adopted partially the horizontal culture," although he is determined to adopt his own plan, and execute it in his own way.* With all my heart, I wish him success in his efforts, though I much fear that his scheme of paving roughly with stone where convenient, or lining with facines the bottom of his gullies for letting off the water, will be too tedious, and "expensive for *practical* purposes."†

Before taking leave of Mr. Ellison, I must beg leave to give my unqualified dissent to one of his positions. It is where he states that "I find from experiment and observation that no plan which contemplates arresting the water, in the smallest degree in its course, will succeed." Now I admit that where the waters are suffered to accumulate to any considerable extent, the position may be partly correct. But all will remember that the very merit and use of ploughing on the level, is to prevent this accumulation of waters; and from actual experience in cultivating a good deal of hilly land, in this way, for more than two years, I hazard nothing in the assertion, that careful and skilful ploughing, with ploughs suited to the culture, will effect the object, to a very useful extent. I do not pretend that this concentration of water has been invariably prevented by me, for much of my land had been previously washed into gullies, which in some instances we did not attempt to stop, but straitened them to give vent to the water. My plantation besides, was a good deal beset with roads, and bald, hard places, which greatly facilitated the collection of water. But independent of these disadvantages, which we know are not incident to new-clearings and new-settled places, I venture to assert there are now but few washes on all my lands thus cultivated. In confirmation of the practibility of this plan, I un-

* Vide page 180. † Page 181.

derstood Col. Pinckney and Mr. Calhoun, both of whom had made some experiments in Pendleton, as giving an opinion, that with good ploughs and approved skill, uneven lands might be *effectually* preserved from washing in this mode—I only give my belief, that great good may be effected by it.

(To be continued.)

ART. III.—*Memoranda of the Culture of the Sugar Cane, and Manufacture of Sugar: by* B. McBRIDE.

Hickory Hill, February 17th, 1830.

Dear Sir,—Your letter under date, 29th January, came to hand on the 7th inst., and should have been answered before this, but for my own and family's indisposition. I feel satisfied that I shall fail in rendering such information, as you anticipate, on the subject of the Sugar Cane. The many able and experienced hands, who have preceded me on this subject, leave but a limited space for me or my operations; however, it is with pleasure that I contribute the result of what I have realized from my little practice (more for amusement than any thing else) in both the growing and manufacturing Sugar from the Cane, made upon my own soil; and, if the success of these few experiments should have the effect of giving fresh vigour, and imparting new energy to the agriculturists of my own state, or in fact any other, I shall be truly gratified. In complying with your wish, I cannot conceive a better plan, than to give extracts *verbatim* from my agricultural *note book*, relative to Sugar Cane, commencing as follows:

"1828, *Feb.* 11*th*—Planted one hundred and thirty-four hills of Sugar Cane, in each, two eyes of the Otaheite kind, in beds four feet apart from centre to centre. On the same day planted 9 hills of Ribbon cane, in each, 2 eyes, which I brought with me from the Appalachicola river, Florida, in December 1827; 7 germs only, from the 18 eyes came forth; having, as I suppose, been injured from a long journey and cold nights, to which it was unavoidably exposed,—from the 134 hills, I have been more fortunate in sprouts."

"*April 7th and 8th*—White, and in fact, black frost last night."

"*April 10th*—The little effect which these frosts have had on my Cane, particular the Ribbon, is a convincing proof to me, of the hardness of this plant, over that of corn or cotton as the frosts have now shown their fatal effect—corn, cotton, oats, garden peas, &c. &c. all destroyed, and to my great astonishment, my cane appears to be in good health, at least the stalk part."

"*April 14th*—in fact so far as I have seen yet it appears to be the hardiest among all the first born infants of the spring, for even oaks and other trees have been killed to the mother stump." In addition to these extracts, I will here observe that this cane was from 3 to 10 inches high when the frost came, and that it was more or less protected by the pine trees of the adjoining woodland. The top blades were singed, leaving a green stalk from one to three inches from the ground, which put forth and was quickly accelerated from a few days warm sun, but not so with corn. All was ploughed up, as was my cotton, and planted anew.

"*Oct. 20th*—White frost last night cut my patch 134 hills of cane, in fact less; only 122 came up, and find 1034 full grown stalks; and 76 stalks from the seven hills of Ribbon, all of which are matured from 14 to 16 joints, say 5½ feet. These canes are equal to any presented to my view while in Florida in November and December, 1827—have banked them similar to potatoes."

"1829, *Feb. 10th*—have this day taken out the canes, which were banked on the 20th October last, and am mortified to find, from a close examination, that there is not one good eye among all my Otaheite, while, to my great astonishment, every eye of the 76 Ribbon cane are sound, although in the same bank. This loss was caused from a large air-hole which had been left with the intention of closing at some future day, but was neglected, and which gave too free access to the cold air on the 11th and 12th days of January—days which were cold to excess. This plan of banking will not do, the cane should be covered over entire, without an air-hole. Three inches of earth with pine straw will be quite enough."

"*Feb. 11th*—Cut and planted the 76 Ribbon cane, making 90 hills 6 feet apart."

"*March* 2*d*—Recovered to-day, after three weeks deligent search, 800 cane of the Otaheite kind, being all I could obtain."

"*March* 4*th*—And have chosen this day to plant them, being the first day of a new administration by President Jackson—and with this administration, will commence this new culture, with a determination to pursue it, should I live so long, at least, as his administration lasts, and if successful, longer of course. Having my land previously prepared by throwing five furrows together with a straight sided half shovel plough, forming a bed of two feet wide, in the centre of which, was run a furrow of 8 inches wide and 6 deep, giving me quite space enough for compost, and to place the cane with the eyes horizontal; have planted it in three different places—lands of equal fertility, as follows:

703	hills,	two eyes to each plant,	4	feet apart,
1096	do.	do.	5	do.
1434	do.	do.	6	do.
3233				

These, together with the Ribbon and last years' Ratoon, are almost equal to two acres, at 5 feet distant."

"*April* 15*th*—I am sorry to see my cane so backward in germinating, except the Ribbon, every hill of which is now up, and from 6 to 10 inches high."

"*May* 10*th*—Since the 15th of April, there is great improvement in all my cane."

"*June* 20*th*—Part of my cane planted in the lowest land, looks bad and diseased, owing to, too much rain, which has completely saturated the earth, this I cannot remedy for want of proper drains. I find that cane will stand a partial inundation well, as is proved with a few hills planted in my rice-field, which were several times partially overflowed, but not long enough to suffer, the earth was completely filled with water before the proper drains could take it off, this cane was equal to any made, but a saturated soil, if suffered to continue so, will, I am convinced, destroy this plant."

"*July* 27*th*—Great improvement is visable in my cane, particularly the Ribbon, which looks luxuriously beautiful, from 4 to 7 feet high, averaging about 14 stalks to the hill, while the Otaheite only from 8 to 10. This day finishes the

husbandry of my cane, which was performed alternately with the plough and hoe to equal advantage, requiring about the same labour, as that of a corn crop, excepting the planting, which is more tedious. I now leave it for future operations in the fall—it now wants rain."

"*Aug. 25th*—Prospects of cane, gloomy—no rain yet."

"*Sept. 28th*—More gloomy, a few tender showers from heaven, would be thankfully received by the laborious man who has done his part."

"*Oct. 21st*—Prospects worse, cane ruined, growth retarded for want of rain. From the 7th of July till the present day, not rain enough to lay the dust, yet wonderful to tell, some parts of my Otaheite cane is perfectly dead, while other parts have continued to grow slowly, and have matured from 8 to 12 joints. The Ribbon has stood both, the wet in the spring, and the present and past drought much the best, (having matured from 12 to 14 joints,) and none have died as the Otaheite. Fully confirming (in my opinion,) that it is far the best cane for a *certain* crop, as it withstands wet, dry, cold and heat most astonishingly."

"*Oct. 31st*—Finding some vicissitude in the air for a few evenings past indicative of frost, I have cut down with a broad sharp and heavy spade (far the best implement for the purpose,) my patch of 703 hills of cane, (less, 96 hills destroyed) which I have banked for seed, and regret that I have not land prepared at this moment for its reception, being fully convinced as I am, that the best time for planting cane is at the time it is cut down, *before frost;* this not only prevents the trouble of banking and taking out, but it saves the unavoidable destruction of many thousand eyes, which when banked germinate from the created heat, and are broken off by the handlers while planting. Again, so soon as a cane is placed in the earth, notwithstanding cold weather, with 8 inches of soil upon it, it commences to put forth roots ready to force and support an early sprout in the spring, this I have witnessed from the few plants of Ribbon, brought with me from Florida in December, 1827; which on my arrival home were placed in my garden, covered with at least 8 inches of dirt; in taking the same up in February 7th, ensuing, I found *many roots* from each *joint*, 2, 4 and 6 inches long, which were seeking support for the germs, *then* started from 2 to 4 inches from each eye. Influ-

enced by these observations, (unless my mind be hereafter changed by others) I shall ever plant cane in October, November or December, but during the two former if possible; this may be conveniently done, by curtailing my cotton crop, say one half or more, and substituting cane in its place, say 2½ acres of cane and 2 or 2½ of cotton to each hand, quite as much as I should ever desire, and while neither of these half crops would interfere with the other, in housing or manufacturing, I believe they could be made both convenient and profitable. For the last seven years I have had, by the 15th of October, picked in, nine-tenths of my Mexican cotton; at which time I could conveniently have commenced operations with the cane, with all able hands, leaving the residue of my cotton to be picked in with such hands, as were not well able to perform the labour required among cane: but here I have calculated from a full crop of cotton, with a half crop, as intended, I can commence with cane, if necessary, by the 1st of October or before, giving plenty of time, both to plant the ensuing crop of cane and manufacture the present half crop, with proper means to do so, by the 1st of December, leaving quite time enough until spring to gin and send the cotton to market, &c. &c. These are the views which I have taken, and leave them here on record for future experiment."

"*Nov. 7th*—Cut my Ribbons canes, 1264 stalks from 90 hills, and notwithstanding several severe frosts to which these canes were exposed, I find them sound with but few exceptions of the outside stalks; the *interior* of the hills being so completely protected by their density as to prevent the cold from penetrating; in fact, nothing short of a freeze will destroy this plant. Have also cut and banked my patch of 1434 hills, (less 196 destroyed by moles, and dead canes;) find they have been much injured by frost—only a few good eyes near the root; shall grind these as soon as convenient."

"*Nov.* 24—Finding the weather cold, and my mill not ready for operation, I have cut my patch of 1096 hills of cane (less 134 dead and destroyed by moles) which I intend to crush, so soon as my mill is finished, and for fear of too great *acidity* with these, now half frozen cane, which would be the case from the *created* heat in *banking*, I have placed them in *piles* and covered them with pine straw, so as to allow free access of air. My Ratoon canes, I have also cut,

they are equal to the best of the Otaheite plant canes, and sweet almost to excess."

Dec. 8—My mill being ready for operation, have expressed the juice from the canes last cut down and *not banked*, and commenced the process of boiling in three plantation pots, placed in a furnace, containing 75 gallons. Boiled from 11 o'clock, A. M. till 10 minutes past 4 P. M.—emptied into coolers, and it granulated immediately; it was then put into a drainer of an inverted conical form with a hole at the bottom, for the molasses to escape. In *tempering* or refining the juice before boiling, I find from prior experiments on a smaller scale, that one gill of lime first dissolved in warm water, quite sufficient for every 65 gallons of juice, more made the sugar clammy, from which I suppose too much lime had been used; quick and attentive skimming of the impurities, which rise with great rapidity while boiling, is indispensable."

" *Dec.* 10*th*—Extracted with my mill and one poney, 65 gallons of juice in 28 minutes, added one gill of lime as before; boiled 4 hours and 45 minutes, which when emptied, granulated immediately, put to drain in a barrel with holes at the bottom, and some part in oznaburg bags."

" *Dec.* 14*th*—Have to day extracted the juice from the canes cut and banked on the 7th of November. Boiled 4 hours 55 minutes. Emptied, but no granulation for 30 or 36 hours after. Second boiling, added more lime with dried pulverised clay, but with no better success, from 24 to 36 hours before granulation. Third boiling, on a smaller scale, added still more lime without any good effect, granulated about the same time, but the sugar clammy from too much lime being used, as I suppose. The created heat in banking these canes, had caused all of the sound eyes to sprout, from which, I must believe, the sacharine or granulating sweets, have been contaminated."

" *December* 16*th*—Extracted and filled my boilers with the juice of the unbanked cane, added my quantum of lime; boiled 4 hours and 36 minutes; emptied and it granulated forthwith. Second and third boiling, the same process; and the same effect."

" *Dec.* 28—Not having tried my Ribbon cane, (owing to the small quantity for seed) I felt anxious to do so, and for that purpose extracted one measured gallon of juice

which I reduced to sugar in 64 minutes from the first ebullition of the pot. This goes to prove, to my satisfaction, that the Ribbon cane is far superior to the Otaheite, or in other words, the juice is higher charged with the sweets necessary for granulation. This ends my process in boiling sugar for this season, having reached the desideratum aimed at; that of making sugar from the cane of my own soil."

"*Dec. 30th*—Finished planting all my seed cane to day in beds four feet from centre to centre, prepared with the plough, (as it was the last year,) placing the cane thus ⟷ turning top and butt together, with the eyes in a horizontal position. I find beds four feet apart, to be the proper distance to plant canes in; and, from observation, I have been induced to believe, that their maturity is greatly accelerated by their density, although when planted thin, they will, no doubt, grow larger, and, from an external view, appear matured as high as those that are thicker, and of course smaller; yet, from a close examination of the larger cane's internal part, there will be found (such was the case with mine) in the centre, the diameter of this ○, which, from all appearance, does not mature, while nothing of this kind can be found in the centre of the small and thick canes. Again, the small canes are much easier and more effectually crushed in the mill than over-grown ones."

Thus end, Sir, the extracts of some few facts, realized from my experiments in the sugar business, which you can, from their extended length, curtail, should you think proper, and as to the opinions, which I have ventured to accompany them with, they are such as were, at the moment of my operations, conceived. I do not, therefore, pretend to vouch for their correctness, but you must take them for what they are worth; they are, however, such opinions as must govern me in my future operations, until from experience, I can conceive better. The South-Carolinians do not want excitement to induce them to undertake what is supposed lucrative; but, what is to be most regretted, I fear we are equally quick to despond without making a fair and manly struggle to surmount what we may suppose difficulties; but in this instance of excitement, in growing the cane and manufacturing sugar in this State, I must hope that we shall hold out to a good end; it wants nothing but enterprize and industry

to be completely successful, these alone will call science to our aid. The Lousianians, I have been told, make from 2 to 3, and even 4000 pounds of sugar to the acre, and plant 5 acres to each hand. Such pictures of fancy shall never disturb me. I have a statement showing that upwards of 4000 pounds of sugar could, or had been made, from one acre of cane, in Florida, *without manure too;* and another, 3600 pounds; but these are nothing more Sir, than golden dreams never realized. Could I be made to believe it, I would soon leave this, my beloved State, though equal to the best, and precipitately take flight to some of those fertile spots. And who is it, that would not be allured in the same way? That from 1000 to 1500 pounds of sugar per acre can be made in Louisiana or Florida, I have no doubt, nor have I the least doubt, but that 1000lbs. may be made from an acre of good land in South-Carolina; for instance, on such land, as is considered the best between Savannah and Charleston, south of 33°. But, Sir, I shall be content to realize 600 pounds per acre, and plant only 2½ acres to the hand with 2 or 2½ of cotton or rice. This, at $10 per hundred, adding the molasses, would give me $150; this added to 2½ acres of cotton, say $35, would be $185 per hand; this calculation is certainly low enough, yet I believe the sum more than equal to what the best agriculturists are realizing at this time, and *three* times as much as one-half are—again, by adopting this mode of planting, the husbandman could bring into repute such lands, as he has heretofore found of no value, for the production of cotton, yet well adapted to the growth of the cane: for example, rich bay or swamp lands well drained. A full crop, or 5 acres of cane to the hand, could not be planted, without augmenting the expenses for the manufacturing of sugar (so as to complete it at a proper time) to a fearful extent, while half a crop may be manufactured, in due time, at but a small expense; consequently will suit both the land and purse of the yeoman best. These, however, are my views on the subject, and such as I shall attempt to accomplish; but I shall proceed *cautiously*, $300 worth of boilers must answer me. Necessary houses to answer the purpose can be built with but little trouble or expense; for instance, a clay walled house (to save the expense of brick) will answer an excellent purpose for both a boiling and draining house, and if any man should be so unfor-

tunate as not to have *clay*, it is to be hoped that he has *pine poles*, which can be substituted in lieu. The common gin houses will answer every purpose for grinding the cane in, by setting aside the cog-wheel for a few weeks. This season of making sugar too, will be one of festivity, both to man and beast—the agreeable juice of the cane is nourishing to the corporeal frame, from which man and beast must derive health and vigour—in fact, myself, children, negroes, cattle, hogs, dogs, all fed upon the cane and its offals, during the process of boiling.

I had almost forgotten your request, as regards manure, and must answer it with but few words, as my communication has become tedious. Every year for the last ten, has increased my esteem for this auxiliary of the husbandman, which I make in various ways; however, my principal plan is, to keep my pens well covered, both winter and summer, with oak leaves, pine straw, swamp mud, &c. &c. and when *well trodden* by stock, it is thrown up in large piles, which remains for at least *twelve months* before it is used, after which time it is quite immaterial to me on which side of a hill, or whether at top or bottom, it is placed, so that a proper quantum, not *excess*, be applied in due time, and well covered or admixed with the soil; it has in every instance, when applied in this way, proved its great utility to me—but not so with *new* compost. Nothing can be better manure for the sugar cane than cotton seed, but this, as well as other plants, may be manured to excess. My crop for the last eight years prior to 1829, has been what I will call an average one to the hand, but last year difficulties met me at every step.

I well recollect the purport of the directions, to which you allude, furnished Mr. Speights some four or five years since, for the regulations of my plantation, during my absence to the Western country, and can venture to say, at this time, that such arrangements as those answered, with but few, if any exceptions, and serve at this day to govern me in my police and management of my farm, &c. With these views, I beg leave to tender you my best wishes for the success of your useful labours. B. McBRIDE.

ART. IV.—*Account of the Culture and Produce of the Bearded Rice: by* A GEORGIAN.

Savannah, 20th April, 1830.

Mr. Editor,—I am fearful from the untowardness of the season of last year, that the expectations of many have been disappointed in regard to the productiveness of the Bearded Rice, and that its cultivation, in consequence, will be retarded rather then extended; a circumstance, I should regret, as I am convinced it is a grain that, in favourable seasons, will well reward the cultivator. I did not become a subscriber to your valuable work until the month of May, last year, and with the first number I was so much pleased, that I soon obtained all the numbers of that year then out, as also, those of the preceding year. The manner in which the Bearded Rice was recommended, struck my attention, and, although the season for planting was advanced far beyond the proper time, I procured half a bushel of seed and planted it in a low place, where I had formerly grown the common rice, which never, however, succeeded well, from there not being a sufficiency of moisture. With the half bushel of seed, I planted, on the 22d of May, seven tasks, (within one task of two acres, as a planter well knows;) it was planted in trenches, two and a half feet apart, and spread very thin. A day or two after planting, there was a heavy fall of rain, and again the second week in June, the rain fell most profusely for a day and night, after which drought succeeded; and, except one or two pretty good showers, it received little more until it was harvested. It, however, grew luxuriantly and eared well; there was some appearance of blight occasioned, no doubt, by the drought, for the land on which it grew, although low, became as dry as the highest land on the plantation. The whole was harvested about the 20th of October, and made up into a rick, in the common way. I think, I must have lost three or four bushels by delays in harvesting; it should have been cut rather before being quite ripe, as I have been told since, to prevent its shelling off, which it does greatly when fully ripe. I thrashed it out in the month of February last, and notwithstanding the late planting, and the very dry season, I realized sixty

bushels of excellent rice, quite equal to the common rice for the table, and if ground fine, which can very easily be done, it makes a delicious cake for breakfast. Should this statement appear calculated to encourage others to make further experiments in the culture of the Bearded Rice, you may, if the style is not too homely, give it a corner in the Agriculturist. Regretting that I have it not in my power to afford more important matter for your publication. I am, respectfully, yours, A GEORGIAN.

ART V.—*On the Necessity of Protecting the Stems of Trees from the Influence of the Sun: by* E. A. HOLT.

Richmond County, (Geo.) April 8th, 1830.

Mr. Editor,—In February and March, 1829, I planted out a number of Forest Trees of different kinds, for shade and ornament. I succeeded but badly with them, all put out leaves and promised to grow. The spring and early part of the summer being wet, I had no need to water them; but in July and August, I did; yet with all my care and to my great surprise, in September, I found my trees dying—this I could not account for, and mentioned the circumstance to a friend, who informed me he had but lately discovered, that it was the hot sun of our summer which occasioned this, and more especially of the month of August; he told me if I would examine those trees, I supposed to be sound, I would probably find them dead on the south side, which I found to be the fact.

For some length of time I had discovered that the bark of the fruit trees was much injured, and attributed it to worms, which I endeavoured to destroy; but as soon as I found out the cause of the death of my shade trees, I went to examine the fruit trees, and I found them dead invariably on the south side when they were injured at all, which was generally the case, except in very young trees. I found the apple much injured, the green gage and Mogul plumb badly injured, and the pear much hurt. In fact any tree, (unless it be our hardy native) that has not a good umbrage, so that the trunk is well protected from the sun, is liable, and will be injured in the same way. I make this

known to you, Sir, for the benefit of those who are not acquainted with this fact, that they may guard against the evil, and box their newly planted shade trees, and wrap straw round the trunks of their fruit trees, especially the those I have named. Respectfully, E. A. HOLT.

ART. VI.—*On the Preservation of the Sweet Potatoe: by* BEAUFORT.

Hickory Hill, (S. C.) 17th April, 1830.

Dear Sir,—At the time you wrote for information on the subject of preserving the sweet potatoe from rot, I calculated that ere this, some one more adequate would have given you satisfactory information, or I would have attended immediately to your request.

I will now proceed to give you the plans pursued by me for years, which have so far enabled me, to keep the sweet potatoe, from harvest until May and June, with a loss of *not more* than *one bushel per thousand.*

In the first place, I select an elevated place to plant; I prefer a sandy to any other soil, which produces well, when manured by stock; the reason I prefer an elevated situation for the potatoe, is, that it does not partake of an over abundance of sap, which I have observed in potatoes grown in bottom lands, (and particularly if the fall season be wet); this sap, I am of opinion, is a cause, within itself, of so much rot in potatoes. The next object is to gather or house them before a hard frost, in the fall, for if allowed to stay in the field until after a heavy frost many of the top ends are liable to be frost bitten, which brings on a decay after banking, and the decay becomes contagious to a considerable part of the bank. In digging, the potatoes should not be thrown on each other, which is apt to bruise them, particularly when they are of a large size;—those cut should be carefully assorted and used first, as they are apt to decay.

In moving potatoes from the field to the bank, care should be used to prevent bruising them; my plan is to load the wagon with baskets, and allow a sufficient number of

strong hands to go with it to empty the potatoes on the bank with ease and care. When they are put in banks (40 or 50 baskets) if the weather is moderate, throw straw over them and let them stand to receive the benefit of the air for a day or two, this is of service to them. My mode of banking, is to throw a coat of pine straw over the potatoes first, over it lay pine bark, then corn or fennel stalks; bank lightly at first, leaving an air-hole at top; and, as the cold increases, increase the dirt in proportion, and if excessively cold, stop the air-hole at top, which should be re-opened as the weather becomes mild; the dirt I never take off after putting it on. If these simple ideas are of service to you, use them.

BEAUFORT.

ART. VII.—*On the Introduction of Tea into the Southern States, with a few observations on the Silk Worm: by* THOMAS SPALDING.

Darien, (Geo.) April 9th, 1830.

Dear Sir,—I received the Agriculturist last night, and read the letter that you alluded to on the subject of tea, in Brazils; I had long since known that the late King John, of Portugal, had introduced a colony of Chinese into the Brazils, for the purpose of cultivating the tea-plant, and other things; and I had taken some pains to inquire when opportunity afforded me, whether the cultivation had extended beyond the little plantation originally introduced by the King, but could not learn that it had. The process described in your paper, is certainly very simple, and would not be attended with much expenditure of either labour or money; but, for my own part, I cannot conceive that the finest qualities of tea could be produced by that process—only remark how very slight the operation must be, between substances so light as tea-leaves, shaken between screens. We must remark that Imperial and Gunpowder Teas, are very compactly and neatly rolled together, which must have been accomplished by some very different process. In fact, there are long details upon the subject of tea, with a num-

ber of drawings, in Ackerman's Repository, from which we should be led to suppose, that the preparation of tea from the plant, to its boxing for market, must be a slow process, requiring much expenditure of manual labour. It is to be regretted, that some, among the many trading to Rio Janario, have not brought from thence a specimen of their home grown tea, by which we, ourselves, could at once judge of its comparative value with the teas of the East. As to the adaptation of the climate to the tea plant, there never has been any doubt upon the mind of any reflecting person; the plants growing upon Skidaway Island, in Governor Milledge's garden, (alluded to by your correspondent from St. Simons) I, myself, saw growing, for successive years, with great vigour, in a very open and exposed situation; and Mr. Young of Savannah, among his beautiful collection of other plants, has got the tea in all its varieties, growing in the open air; he has also the flowering olive, which we have understood, (with what truth I am not able to say,) is employed by the Chinese to flavour their finer teas. This flowering olive is of itself a pretty plant and the flowers quite fragrant. Mr. Young, among others with whom I have conversed, seems to consider this as an appendage to the finer qualities of tea. As it is twenty odd years, since I saw the tea growing in the open air in this country, I have of course, among the various agricultural subjects that passed through my mind, in these series of years, naturally revolved the idea of growing tea, but as naturally supposed, that tea, like silk, and coffee, and even sugar, would have passed from the East, to the Southern districts of Europe or America, under the enterprizing governments that existed in Europe, soon after the discovery of the passage round the Cape of Good Hope, if there had not been some causes to prevent the extension of the culture, besides that of climate or soil.

Every nation in Europe has, in turn, been subjected to vexatious proceedings by the Chinese, and the China trade has at all times, up to the present hour, been a trade exhausting capital, and absorbing the specie mediums of the different countries that carried it on. There could not have been, therefore, any want of desire on the part of European nations, to find substitutes for one of the heaviest articles in this trade, if there had not been difficulties in the way, that

do not probably present themselves to us, without some practical knowledge upon the subject.

Among the first impressions that I received upon reading the paper contained in the Agriculturist, was the exaggerated expectation of the writer as to the quantity and facility of gathering the leaf of the tea plant; in supposing that seven men would be sufficient to attend one hundred acres, I should be tempted to reverse the figures, and say to you, under my first impression, that it would possibly require almost one hundred men carefully to pick and well to prepare the leaves of seven acres. It is known to us, who are agriculturists, that the leaves of plants are as essential to them, as their roots, and if you wish the plant to be preserved in health and vigour, you must not rudely or roughly strip off the leaves from it, and in taking one set of leaves, you must not disturb the germs of others that may be nestling under them; there are few plants that exist, that will bear being stripped more than once per year, without drooping, and no doubt, in a very few years perishing; this is evidenced in the case of the mulberry tree, reared for the silk worm, and which, consequently, confines the growers of silk to a single hatching of the worms, in spite of the idle theories, which have been broached by inexperienced men, at different times upon the subject.

And if there is any truth in the various details that we have had upon tea formerly, the quality of the tea, within its general arrangement, depends very much upon the period of gathering the leaves; it must, therefore, be important, that there should be hands enough provided within a proper period, carefully to pick the leaves from the plants, to cure them, and box them, for we know by sad experience, that teas will not bear being exposed for any length of time to the open air, without losing that flavour and fragrance which lovers of tea consider necessary, and constituting its essential property.

My conclusion, then, upon all this, is, that tea is not one among the articles offered to the Southern Agriculturist, as a substitute to the many valuable objects, that are already within his range, and within his practical experience.

That if it had been so, it would have been introduced into Spain, when sugar and silk were introduced from the

East. It would have been introduced into the Italian States, when silk was introduced by some one or other of the enlightened, though rival governments which occupied the North of Italy. It would have been introduced into France, by a Colbert, or some one or other of the ministers of Louis the XIVth, and his successors, who carried coffee from the East, to the American Islands. The climate of all these countries were adapted to the growth of the tea-plant, for if America is ten degrees colder than Europe, that part of Asia in which China is situated, is almost ten degrees colder than America. I had somewhere read of frost having been seen at Macoa, below Canton, which I could scarcely believe, until it was confirmed to me by the late Dr. Baldwin, who had been induced, in his great love for botany and the natural sciences, to spend a winter in China, he answered me, he had seen a crust of ice formed upon water at Canton, in latitude 21°. China then, in the latitude of 29°, would probably be as cold as North-Carolina, and colder than either South-Carolina or Georgia.

But if the cultivation of the tea-plant is no object, every day's experience convinces me, that silk will become a great object to the Southern States in the end. I find, that, although formerly I used to fail in attempting to multiply the black mulberry by cuttings, that the white mulberry grows with ease, if taken off the parent plant when the buds first swell, and then kept covered up in the earth until we are free from the apprehension of spring frosts, when the cuttings should be laid carefully in a trench, and well manured, with a single bud above the surface of the ground.

I noticed in one of your papers in the last Agriculturist, that the Chloride of lime is recommended for the purifying the apartments where the silk worms are kept; now you may remember, that in my letter upon the subject of silk, published by you long since, I stated the opinions of Dr. Anderson, of Madras, upon the importance of using lime in all ablutions about your silk worms, and what was more extraordinary still, the benefits that he saw take place from sprinkling slacked lime over the worms that appeared to be diseased. I think, I added, in that communication, that I had been induced by something that I had read in an almanac or newspaper, in the year 1825, to try what effect lime

would have upon the caterpillars that were then commencing their destructive operations upon my cotton; and to my utter amazement, I saw caterpillars the next day after the attempt, in the full exercise of all their destructive qualities, with their backs actually whitened with lime. I will, therefore, conclude with saying, that in all our efforts towards the rearing of silk, we are to find in lime, a remedy for the diseases to which the worm is incident, and a security to the health of those who may be in attendance on them.

I remain, Dear Sir, yours, &c.

T. SPALDING.

Copy of a letter addressed to Mr. N. HERBEMONT, *by* Mr. ABRAHAM GEIGER, *and offered by him to the United Agricultural Society of South-Carolina.*

Mount Gill, November 25th, 1829.

My Dear Sir,—In your last communication to me, you were so good as to inform me that the United Agricultural Society offered a premium to the person who should produce the greatest quantity of wine to the acre of grapes. Will you be so polite as to inform the Society, that I produced from one acre something better than two pipes of wine: say 270 gallons or upwards. Should it appear that I am entitled to the premium, it is not my wish to receive it, but, that that honourable body should still hold it out as a further reward for the perfection of some more useful experiment. If I am spared, I will furnish the Society at their next annual meeting with a few bottles of this wine, as a sample.

You ask my opinion as to the "*rot* in grapes?" Far from being idle, I have made many inquiries on this subject, and have been engaged, together with Mr. Charles Heller, in making examinations with the microscope and otherwise; but we have come to no conclusion, as to the cause of this disease.

Some persons think it owing to the effects of a hot sun, immediately after a rain—others, that it is produced by

low, damp situations—some again attribute it to too much shade—all which opinions appear to me unsound, though it is certain, that grapes are more subject to the rot in low situations than elsewhere. Indeed, as far as I have been able to trace this subject, the real cause has not yet come to light. I am inclined, however, to the belief, that it is produced by some insect.

Would it not be very advisable for the honourable Agricultural Society, to offer a handsome premium for the discovery of the cause of the rot in grapes, and its preventative. If the Society feel a willingness to do so, I will pay $25 towards the attainment of so desirable an end; which would at once warrant the planter to extend the cultivation of the vine. If this disease cannot be prevented, I have very great doubts whether the vine-culture would be worthy of attention. The spring frosts we may contend with, for they never can be so severe as to prevent vines from yielding something like half a crop at least; but the rot discourages the most sanguine planter. Yours, very respectfully.

ABRAHAM GEIGER.

PART II.

REVIEW.

ART. I.—*Essays on the Management of the Dairy; including the modern practice of the best Districts in the Manufacture of Cheese and Butter. Deduced from a series of observations made during thirty years' practice; by* J. TWAMLEY, and Others. London, 1816.

(Concluded from page 320.)

We now come to the process of manufacturing cheese, and although it is not probable that we shall (at least for some time to come, if ever) engage in this, as a source of income, yet, as many would no doubt be induced to make it for their own consumption, especially those who reside at a distance from a market, we are induced to lay before our readers such information as is given by our author. A cheese dairy should consist of four rooms, viz. one for receiving the milk, one for making and pressing the cheese, one for setting the cheese, and another for keeping them, until they are mellow or sent to market; this last may be a loft over the others. These rooms are almost indispensable, where the business is conducted on a large scale, as every operation ought then to be carried on in separate apartments, but where only a few are made for the use of the family, some of these rooms may be dispensed with.

The first thing to be attended to is the preparation of the rennet, for although acids will coagulate milk, yet the maw of a young calf is decidedly the best for this purpose, and is almost universally used.* Many receipts are given both by our author and others who have written on the subject. The following is the most simple, and we have found it as efficient as any of the others.

"After purchasing the maws, dairy-women usually take out the curd; which, after being repeatedly washed in cold water, together with the bag that contained it, is again replaced with a considerable addition of salt; both are then packed in a jar, and a very strong brine of tepid salt and water is poured upon them, in the proportion of about two quarts to each skin. After some time, the maw is taken out; and, an additional quantity of salt being applied, it is stretched upon a bow, and hung up to dry, and in this state remains for use. Rennet thus prepared is used in the following man-

* The Dutch make use of Muriatic Acid.

ner: the night before the cheese is made, a piece of the maw, of the size of one or two inches, is cut off, and steeped in a few spoontuls of warm water; on the following morning, the liquor is strained off, and applied to the milk. One inch, it is said, will serve to coagulate the milk of five cows."

For the information of those who may wish a finer flavour imparted to their cheese, we annex the two following, the first taken from the "Bath Papers," and the other from the "Rural Economy of Norfolk," by Marshall:—

"When the vell, maw, or rennet-bag is fit for use, three pints or two quarts of clean and sweet soft water, are to be mixed with salt, in which should be put rose leaves and flowers, cinnamon, mace, cloves, and, in short, almost every sort of spice and aromatic than can be procured. These, if put into two quarts of water, must boil gently till the liquor is reduced to three pints, and care should be taken that the liquor be not smoked. The spices, &c. are now to be strained off, and the liquor is to be poured upon the rennet bag milk-warm, a lemon is then to be sliced into it, and after standing for a day or two, it is again to be strained and bottled for use. If well corked, it will retain its goodness for a year or longer, and a small quantity will be sufficient to coagulate the milk, and impart an agreeable flavour to the cheese which may be made with it. Mr. Hazard further states, that if the rennet bag be salted and dried for a week or two near the fire, it may be again employed for the same purpose."

"Take a calf's bag, maw, or stomach; and, having taken out the curd contained therein, wash it clean, and salt it thoroughly inside and out, leaving a white coat of salt over every part of it. Put it into an earthern jar, or other vessel, and let it stand three or four days; in which time it will have formed the salt and its own natural juice into a pickle. Take it out of the jar, and hang it up for two or three days, to let the pickle drain from it.—Resalt it, place it again in a jar; cover it tight down with a paper, pierced with a large pin, and in this state let it remain till wanted for use. In this state it ought to be kept twelve months; it may, however, in case of necessity, be used a few days after it has received the second salting; but it will not be so strong as if kept a longer time.

"In order to prepare this rennet for use, Mr. Marshall gives the following directions: 'Take a handful of leaves of sweet-briar, the same quantity of the leaves of dog-rose, and the like quantity of bramble leaves: boil them in a gallon of water, with three or four handfuls of salt, about a quarter of an hour; strain off the liquor, and, having let it stand till perfectly cool, put it into an earthen vessel, and add to it the maw, prepared as above. To this is added, a good sound lemon, stuck round with about a quarter of an ounce of cloves, which give the rennet an agreeable flavour?"

Our author adds:—

"The strength of the rennet thus prepared, will increase in proportion to the length of time during which the bag remains in the liquor: the quantity to be used for the purpose of coagulating milk, can, therefore, be ascertained only by daily use and occupation. In general, however, it may be stated, upon the average, that somewhat less than half a pint of wine measure, will suffice for fifty gallons of milk; for which quantity, in Gloucestershire, the practice is to employ about one-third of a pint."

Several substitutes for rennet are made use of when it cannot be obtained. Such as muriatic acid, and the flowers or leaves of several plants. Those common to England are enumerated; but among these, we do not find mention made of the

artichoke blossom, which is commonly used in this State for the purpose of making "Slip," (that is, new milk coagulated,)—for which purpose it answers well. Although the quality of cheese is never improved by the addition of any colouring matter, but on the contrary very often injured, yet, custom has not only sanctioned its use, but now absolutely requires that that, which was originally intended as a deception, should be continued; several substances were formerly recommended, but *Annotto* is now generally used for that purpose, at the rate of one ounce for every hundred weight of cheese.

In making of cheese, the temperature of the milk, as well as the portion of rennet should be attended to. From 85 to 90 are considered the proper degrees of heat, and the time of coagulation should be from one to two hours. It is preferable (according to our author) to heat the milk when below the proper temparature, by adding hot water, instead of heating the whole mass over the fire. When it is above this temperature, it should be lowered by the addition of cold spring water. The quantity can, in both cases, be ascertained by the thermometer. The remainder of the process we will give in the words of our author.

"In general, from one to two hours will be the proper time for coagulating the milk, which ought to be covered, so as to lose in the process, about five degrees of its original heat. The addition of one or two handfuls of salt to the milk, previously to mixing the rennet, will promote the rendling, or curdling of the milk. But the state of the weather, the season, &c. must all be attended to, in conducting this process, which may sometimes require more than two hours to coagulate the milk. If cheese be made in a hurry, it will invariably be of an inferior quality. Some persons put a bowl in the tub, when the rennet is added to the milk, under the idea that, by taking the bowl out, they can better ascertain when the cheese is come. The consequence of this absurd practice, is, the formation of slip curd; which, dissolving in the cheese, after it is made, produces whey-springs, runs out, and leaves a hole in the cheese, which is further liable to *crack*, and always decays in that place. If, however, a bowl *must* be put in, conformably to an ancient custom, it is certainly best to place it with the hollow part upwards; but the preferable way is, to omit putting the bowl into the vessel altogether, by which the defects just mentioned will be completely avoided.

"When the rendling or coagulation has taken place, the curd is broken or gathered. Various practices, in this part of the business, obtain in different parts of the kingdom: but the following appears to be the most judicious. The curd is first cut with a cheese-knife, in various directions; this causes the whey to arise through the incisions, and the curd sinks with more ease. After a short time the cutting is repeated, still more freely than before; and is continued until the curd is reduced to small uniform particles. This operation will require about three quarters of an hour: the cheese-tub is again covered with a cloth, and is allowed to remain for the same time. When the curd has sunk to the bottom of the vessel, the whey is ladled off by the hand, or by means of a skimming-dish; another quarter of an hour should now be allowed for the curd to settle, drain, and become solid, before it is broken into the vat, as it prevents the fat from being squeezed out through the fingers, and of course contributes to improve the quality of the cheese. Sometimes, in addition to the skimming-dish, a semicircular board

and weight, adapted to the size of the tub, are employed. The curd is again cut as before, in order to promote the free separation of the whey, and pressure is again applied till it be wholly drained off. Great attention is requisite in conducting this part of the business; and if any particles of slip curd should be seen floating in the whey, it ought to be carefully ladled off with the whey; as it will not incorporate with the solid curd, but, dissolving in the cheese, causes whey-springs, as already mentioned, and materially impairs its soundness. If the whey be of a green colour, when ladled or pressed out, it is a certain criterion that the curd has been properly formed: but if it be of a white colour, it is equally certain that the coagulation is imperfect, the cheese will be sweet, and of little value, and much valuable gaseous matter will be completely thrown away. In the counties of Norfolk and Suffolk, the cheese manufacturers have recourse to a somewhat different method for extracting the whey, which is worthy of notice: when they think the milk sufficiently coagulated, they lay a strainer in a basket made for the purpose; into which they put the curd, and suffer it to remain there for some time, to drain, before they break the curd.

"When the curd is sufficiently drained, it is put into two or three separate vessels, and is broken with the hand as small as possible. During this part of the process, salt is scattered over the curd, and intimately mixed with it; the proportion, however, has not been correctly ascertained, and is regulated by experience.

"*Management in the Press.*—The breaking and salting being thus completed, a cloth is spread over the cheese-vat; and, the broken curd being packed into it, and covered up with the cloth, a smooth round board is laid over the vat; which is usually filled to the height of one inch above the brim, to prevent the curd from shrinking below its sides, when the whey is squeezed out. The whole is then put into a press for two hours, at the expiration of which the cheese, being taken out, is put into a vessel of warm or hot whey for an hour or two, in order to harden its skin. On taking the cheese out of the whey, it is wiped dry, and, when it has become cool, is wrapped in a clean dry cloth, of a finer texture, and again subjected to the press for six or eight hours.

"The cheese is now turned a second time, and is taken to the salting-room, where it is rubbed on each side with salt; after which it is wrapped in another dry cloth, of a finer texture than either of the preceding cloths, and is again pressed for twelve or fourteen hours: if any edges project, these are pared off, and the cheese, being laid upon a dry board, is turned every day.

"When cheese goes from the press to the salting-room, it should be kept warm, until it has had a sweat, or has become pretty regularly dry, and stiffish; as it is warmth that ripens cheese, improves its colour, and causes it, when cut, to have a flakey appearance—the surest sign of excellent quality.

"*Management in the Cheese-Room.*—After the processes of salting and drying are completed, the cheeses are deposited in the cheese-room or loft, which should be airy and dry; but on no account should hard and soft cheeses be placed in the same room, for the dampness or moisture arising from the latter will cause the hard cheese to chill, become thick-coated, and often spotted.

"Throughout the whole process of cheese-making, the minutest attention will be requisite: for if the whey be imperfectly expressed, or the rennet be impure, or the cheese be not sufficiently salted, it will become rank and pungent. For this defect there is no remedy. The imperfect separation of the whey will also cause cheese to heave or swell, as well as to run out at the sides. In order to prevent as well as to stop this heaving, the cheese must be laid in a moderately cool and dry place, and be turned regularly every day. If the heaving be very considerable, the cheese must be pricked on both sides in several places, particularly where it is most

elevated, by thrusting a skewer into it: by this pricking, though the heaving will not be altogether prevented, a passage will be given to the confined air, the heaving or swelling will consequently be considerably reduced, and the cavities of the cheese will be less offensive to the eye."

The above is the common process for manufacturing cheese, for general use. There are various other modes, differing somewhat from this, and from each other, which have been adopted in particular countries or districts, producing cheeses of various qualities, and which are known in commerce by the names of the several districts where they are manufactured. We will here extract a few of these receipts, for the benefit of our readers.

"*Brick-bat Cheese* derives its name from the form in which it usually appears, and is generally made in September, in the following manner. Take two gallons of new milk, and a quart of good cream; then warm the cream, and put in two or three spoonfuls of rennet. Two hours at least should be allowed for the coagulation, and even longer, if the whey does not assume a greenish colour. When the curd is properly come, break it a little, and put it into a wooden mould in the shape of a brick: it is then to be pressed a little, and dried. Brick-bat cheese should not be cut until it is twelve months old."

"*Norfolk Cheese.*—The system of cheese management, adopted in this fertile county, has been particularly described by Mr. Marshall; who has detailed the method which was followed in his own dairy; and as this method is an admirably good one, we with pleasure communicate it to the reader.

"As soon as the curd is come at the top, firm enough to discharge its whey, the dairy woman, tucking up her sleeves, plunges her hands to the bottom of the vessel, and with a wooden dish briskly stirs the curd and whey: she then lets go the dish, and, by a circular motion of her hands and arms, violently agitates the whole; carefully breaking every part of the curd; and at intervals stirs it hard to the bottom with the dish, so that not a piece of curd remains unbroken, larger than a hazel nut. This is done to prevent the formation of slip-curd (that is, curd which has passed unbroken through the hands of the dairy-woman); which, retaining its whey, does not press uniformly with the other curd, but in a few days becomes, first livid and jelly-like, and then faulty and rotten. The operation here described requires from five to ten minutes, or, if the quantity of curd be large, a quarter of an hour.

"In a few minutes the curd subsides, leaving the whey clear upon the top; which the dairy-woman lades off, by her dish, into a pail, and empties into a milk lead, to stand for cream to be churned for whey butter. Having laded off all the whey she can, without gathering up the small pieces of loose curd that float near the bottom of the vessel, she spreads a straining-cloth over the cheese-tongs, and strains the whey through it; returning the curd retained in the cloth into the cheese tub. When she has removed all the whey she can obtain by pressing the curd with her hands and the lading-dish, she cuts the curd into small pieces, about two or three inches square. This discharges still more whey, and enables her more easily to take up the curd in order to be broken in the vat.

"Having selected a vat or vats, proportioned to the quantity of curd, so that the cheese, when fully pressed, shall neither over nor under fill the vat, she spreads a cheese-cloth over the vat, into which she again breaks the curd, carefully, squeezing every part with her hands; and the vat being heaped up, and rounded above its top, she folds over the cloth, and places it in the press.

"In autumn, if the weather be cool and moist, the curd is scalded, in order to make the cheese come *quicker to hand*, that is, sooner vendible, and also to prevent a white woolly coat from rising on it. The process of scalding is done in the following manner: If the cheese be made from new milk, *scalding water*, (boiling water with a small quantity of cold whey mixed with it,) is poured over the whole surface of the curd, as it lies at the bottom of the cheese-tub. If, however it be made from skimmed or other inferior milk, the outsides only are scalded, after the curd is in the vat, by first pouring the scalding water on one side, and then, turning the cheesling, pouring it on the other. Supposing then, says Mr. Marshall, the cheesling to be made on Monday morning, at seven o'clock, it is taken out of the vat between eight and nine, the cloth is washed, and immediately replaced in the vat. On Monday evening it is salted; and, if wanted, pared, put into a dry cloth, and again placed in the press. On Tuesday morning it is bare-vatted, that is, put into a vat without any cloth, or the cloth is changed; the cheesling, in either case, being turned, and again put into the press. On Tuesday evening, it is again turned; and on Wednesday morning, it is finally taken out of the vat and press.

"As soon as the cheese become sufficiently firm to be handled with safety, they are well brushed with a hand brush, frequently dipped in whey; and, when nearly dry, are rubbed over with a cloth on which fresh butter has been spread. Thus, they are washed, scraped, rubbed, and turned once a-day, for some weeks, until they acquire a rich golden polish, and the *blue coat* begins to appear. This depends upon the age and quality of the cheese, as well as the state of the weather; so that no certain number of cleanings can be fixed: the *blue coat* will perhaps appear before one month is expired, and perhaps not till the end of two or three months. The cheeses however must be regularly scraped and rubbed, until they are perfectly smooth; and the rind must be mellowed with butter, whenever it becomes dry and harsh.

"*Soft or Slip-Coat Cheese* is made in the following manner: Take six quarts of new milk hot from the cow; the stroakings, or that last drawn from the cow, are the best, being the richest milk. To this are to be added two spoonfuls of rennet; let it stand for three quarters of an hour, or till the curd be fully come, and lay it into a vat with a spoon without breaking, laying it on a trencher or flat board. It is now to be pressed with a four pound weight, or if it be likely to become too hard, with a lighter weight, and turned with a dry cloth, once every hour. When it has become stiff, it must be shifted every day on fresh grass or rushes: it will be fit to cut in the course of ten or fourteen days, or sooner, if the weather be warm. By some persons, baskets made for the purpose are used instead of vats; but, unless the cheese be carried to market in them, vats will in every case be preferable. The milk required to make one pound of butter, will, in general, make two pounds of cheese.

"*Stilton Cheese*, which, from its peculiar richness and flavour, has been called the Parmesan of England, is made in the following manner: The night's cream is put to the morning's milk, with the rennet: when the curd is come, it is not broken, as is usual with other cheese, but is taken out whole, and put into a seive, to drain gradually. While draining it is *gently* pressed, till it becomes firm and dry, when it is placed in a vat, or box made exactly to fit it; as it is so extremely rich, that without this precaution, it is apt to bulge out, and break asunder. It is afterwards kept on dry boards, and turned daily, with cloth binders round it, which are tightened as occasion requires. After being taken out of the vat, the cheese is closely bound with cloths, till it acquires sufficient firmness to support itself: when these cloths are removed, each cheese is brushed once every day for two or three months, and if the weather be moist, twice every day; the tops and bottoms are treated in a similar manner daily, before the cloths are taken off.

Stilton cheese derives its name from the town where it is almost exclusively sold; it is made principally in Leicestershire, though there are also many who manufacture it in the counties of Huntingdon, Rutland, and Northampton. Sometimes the cheeses are made in a net, resembling a cabbage net, which gives them the form of an acorn; but these are neither so good, nor so richly flavoured, as those made in vats, having a thicker coat, and being deficient in that mellowness which causes them to be in such general request. Stilton cheese is not reckoned to be sufficiently mellow for cutting, until it is two years old; and is not saleable unless it is decayed, blue, and moist. In order to mature them the more rapidly, it is a frequent practice to place the cheeses in buckets, which are covered over with *horse dung!* Wine is also reported to be added to the curd, in order to accelerate the ripening of the cheese."

SELECTIONS.

Art. I.—*On the Natural History of the Honey Bee, and on the Importance of its Products.*

[FROM THE NORTH-AMERICAN REVIEW.]

(Continued from page 328.)

We esteem it a very desirable object to make the care of the bee more common than it has hitherto been in this country. Never was there a country more suited to the cultivation of bees. Even in August there is abundance of white clover, and small springs and shallow rivulets appear at every turn. There is no doubt that bees were formerly more frequently kept in America than at present. In many places in New-Jersey, where there is now scarcely a bee to seen, there once existed millions of these insects, to the great profit of their owners. It was common for one dealer in a country town to sell from fifteen to twenty barrels of strained honey alone, to say nothing of wax and comb-honey; as well as a kind of wine, made of the washings of combs called *metheglin*. These articles of commerce have almost disappeared; and we find that it is mainly attributable to the ravages of the millers, or night moths, which have of late years spread destruction through the hives.

The attention of the naturalist has been directed to the history of this fatal enemy of the bee, and many attempts have been made to construct hives that would prevent the millers from depositing their eggs in them; but the plans were defective, because there was no contrivance for inspecting the hives.

Before we close this article, we will endeavour to give a description of a hive, that is so constructed, as to enable any one to

see the interior, and to free it from all extraneous matters, as well as to protect it from the inroads of the night-miller.

On the general subject of the care of bees, the following remarks, the result of experience, may be acceptable to the reader.

The situation of an apiary is of little importance. We have seen bees thrive as well with an eastern as with a northern aspect.

If the entrance of the hive face the north, the bees may possibly be detained within a minute or two later in the summer; but this is more than overbalanced, by the same cause operating in winter, when it is desirable that the bees should remain in the hive. But for ourselves, we have seen no difference in the time of quitting the cells, between those that faced the north, and those that had a southern exposure. Nor have we observed that there is any difference in the welfare of hives, as placed in vallies, or elevated on hills; meaning, of course, hills of thirty or forty feet in height.

We have seen hives prosper, oftentimes, near a pig-sty. We have known colonies of bees to exist for a term of twenty years, with no other protection from the heat and cold than the tops of the hives. They have multiplied equally well under an open shed; but as a free circulation of air is necessary to their health and comfort, so we have never known them to thrive when quite enclosed. A house, therefore, strictly so called, which is shut on all sides, may serve to amuse the observer for a year or two; but there must be an extraordinary combination of fortunate circumstances, if the bees increase while confined in it.

It is better to begin with a single hive, and to attain a knowledge of the habits and instincts of the bees by degrees. We have known several persons, who have purchased a number of hives at once, and relinquished the pursuit, from the perplexity that ensued when the swarming season commenced. But there is no simular occupation so easily followed, and none that requires so little capital, as that of keeping bees. The profit is enormous. If a person, well trained to the employment, should follow the plan adopted in some parts of Europe, of removing the bees from place to place, in a kind of boat or ark, on a river of some length, thus providing a plentiful supply of food, he might increase his stock to any extent.

An apiary of twenty hives, could maintain itself in an area of a mile, where there is plenty of blossoms. Every farmer should, however, provide pasture for his bees, as well as for his cows; and, therefore, when the spring and summer flowers are gone, he should have a field of buckwheat ready; which, although not so palatable as other flowers, will serve the bees for winter food.

An apiary, or bee-shed, should be, at the eaves, about four feet from the ground, with a roof sloping both ways, and with any aspect that the owner chooses. It should be ten feet wide, and the length of it should be increased as the hives multiply. It is, however, difficult to describe one accurately.

The most convenient one that we have ever seen, is on a farm near New Brunswick, in New-Jersey. It is fifty feet long, and and contains sixteen hives on each side. The swarms which are successively cast off, are placed under the same shed in the winter, and an equal number of the old hives are sold to make room for them. This apiary might be enlarged to any extent, were there pasture enough for the bees; but the area of the bees' flight, as there are now many cultivators of bees in this district, does not furnish food enough for a great number.

In this apiary, the miller, or night-moth, is successfully guarded against. A small wire door, formed of needles, and made to slide behind two door-posts, is closed over the entrance of the hive, as soon as the bees have retired for the night. This is done during the months of April, May, and June; after that, if the weather sets in warm, and the bees are oppressed by heat, the floor of the hive is let down; which, as it is fastened to the hive behind with hinges, and on the sides with hooks and staples, can easily be accomplished. Two rows of scantling, or joists, four inches square, and running the whole length of the apiary, receives the hives between them, which are thus suspended at a distance of three feet from the ground.

The hive are thirteen inches square at the top, and is of the same length at the bottom of the front and back; but the bottom of the sides is only seven inches wide. By thus sloping the sides of the hive, the combs wedge themselves as they are made, and there is no occason for the ill contrived crossed sticks, that are generally thrust in the old hives, to keep the combs from falling down by their own weight. The floor is, as we have observed, fastened by hinges and hooks. It is likewise an inclined plane, having a slope towards the front of at least four inches.

The advantages of this slope or inclination will be instantly seen. The perspiration of the bees, which is copious, is, by the inclination of the sides and floor, conveyed off at once, without being absorbed by the boards. All extraneous matter can be carried away by the bees with very little trouble; they can defend themselves from corsair or robber bees, with much greater ease than if the floor was level.

As the floor opens and shuts, so the observer can inspect the interior of the hive at pleasure; not indeed with the hope of getting at the minutiæ of the bees' policy, but to see the forwardness of the combs, the number of the bees, and the general ap-

pearance, which a practised eye can soon understand. When the floor of the hive is left down all night, and the bees hang very low from the combs in the morning, they will soon raise themselves up again, if the floor is lifted very gently and slowly, and fastened as usual.

The cover of the hive is, of course, thirteen inches square. It is made of common pine, as is the hive, with two cleats on the upper part, as well to prevent the board from warping, as to prevent the box, or upper story, which is always added, from being moved from its place. The cover of the hive has three holes made in it, of one inch in diameter, within a quarter of an inch of each other. These holes are to allow the bees to pass to the upper box, when the *hive* is full of honey.

It is ascertained, satisfactorily, that the young brood, and the bee-bread, or pollen, are deposited in the hive where the swarm is first put. The holes in the cover are, therefore, kept shut by plugs, until the hive be filled. The holes are then opened, the bees immediately pass up, and if the season be propitious, they fill the upper box with combs and honey, which, as there is neither brood or bee-bread, is of the finest and purest kind.

We have often seen forty, and even sixty, pounds obtained by this simple proceeding; and the box is also used to feed a famished hive in the spring. A single comb left in one of these boxes will sustain a swarm that has eaten up all its honey, until vegetation commences. As the boxes and hives are of equal size, any one box will fit a hive.

When the combs in the hive are three years old, two of them can be taken out every winter, provided there remains honey enough in the nest for the use of the bees. Thirty pounds weight of honey is the average quantity that suffices for a swarm of a large size. The hives in question, weigh when empty, about twelve pounds, a swarm of bees four pounds, the wax two pounds; the whole, therefore, ought to weigh about fifty pounds in November. All above this quantity can be taken out with advantage, as the wax becomes very dark after two or three years. The whole of the combs can be renewed in the course of four years, as the bees replace them early in the spring. We omitted to mention that the height of the back of the hive is twenty-two inches; and of the front, twenty-eight inches; and also that the floor projects in front about three inches; thus forming an apron, or platform, on which the bees alight before they enter in at the little door. Models of this hive have been sent to several Horticultural Societies of Europe, and they are getting into use in this country.

When a swarm is to be hived, the hive is put in a moveable frame, which is easily carried to the tree where the swarm hangs, and this is proved to be the best method of hiving swarms; as the

screws are taken out of the cover, and the hive lifted up to the swarm, into which they are shaken. The frame and hive are then placed on the ground, and the cover is then *gently* laid on, and screwed fast to the hive. Small sticks are put against the apron, and rest on the ground, serving for those bees to ascend that fell to the ground when the main body was shaken into the hive. Bees, from the moment of their leaving the hive, when swarming, until they are fairly settled, and at work in their new habitations, seem stupid and confused. This arises, however, from the precarious situation of their queen. If she fall into the hive when the swarm is shaken in, all the remaining bees will soon find their way to the entrance; for a peculiar sound is emitted by these insects when their queen is present. If, however, she remain on the limb, it will be necessary to shake it again over the hive, as the bees will leave it to fly up to the place where the queen is. When the bees are quiet in the hive (which is ascertained by the number that are seen hovering in front of the entrance, on the wing, and the others ventilating the hive with their wings) the top can be covered with a sheet, doubled several times, to keep off the heat of the sun. The hive must remain in the same spot until eight or nine o'clock in the evening, when two persons can quietly and gently convey it, frame and all, to the apiary, and place the hive, with great care, between the joists, where it is permanently to remain.

Hives should be made and painted a year before they are used, as the smell of paint is disagreeable to the bees.

The smoother the boxes and hives are made, inside and outside, the better for the health of the bees, and for preventing the depositing the eggs of the miller-moth. We must except, however, the inside of the *roofs* of the hive and the box, as they should be rough; for we have ascertained, that the propolis, or bee-glue, does not adhere so closely to a smooth surface at all times.

And here we would remark, that it has been the custom, from the earliest ages, to rub the inside of the hive with a handful of salt and clover, or some other grass, or sweet-scented herb, previously to the swarm's being put into the hive. A clean cool hive, free from any peculiar smell of mustiness, will be acceptable to the bees; and the more closely the hive is joined together, the less labour will the insects have, whose first care is to stop up every crevice, that light and air may be excluded. We must not omit to reprehend, as utterly useless, the vile practice of making an astounding noise, with tin pans and kettles, when the bees are swarming. It may have originated in some ancient superstition, or it may have been the signal to call aid from the fields, to assist in hiving. If harmless, it is unnecessary; and every thing that tends to encumber the management of bees should be avoided.

(To be continued.)

Art. II.—*Culture of Silk—Silkworms.*

[FROM THE BALTIMORE GAZETTE.]

(Continued from page 332.)

The *fixtures* necessary for raising silkworms are, appropriate tables or shelves, in number and size corresponding with the number of worms to be fed. The best form for shelves that I have seen is that adopted by my friend Mr. J. Y. Tomkins of this city. It is about 2½ feet wide, by 5 or 6 feet long, made of thin boards. with a piece 2 inches wide nailed flat on the upper edge along the sides and ends, with legs about a foot long in the corners. The legs do not pass through the table, but leave a part of the hole on the upper side, for the feet of another table to set in. Thus contrived, five or six of these tables are set one above another, and are taken down, cleaned and again set up with facility. One of these shelves will accomodate about 500 worms. If I could suggest any improvement upon these shelves, it would be the substitution of twine net work for the board floors, with slides under them to catch the excrement of the worms. The room or laboratory must of course be of a size proportionate to the number of worms raised, and should be provided with windows or other ventilators on the north and south sides at least; and if one or two ventilators are opened in the ceiling, it will be of great service. These ventilators, however, should have shutters that they may be closed at any time when necessary. Fire places or stoves should also be provided for use when necessary. For the accomodation of 1,000 000 of worms, a room about eighty feet long and forty wide would be required. A large establishment would also require a ware-room for the deposit of leaves, and this should be large, so that in wet weather the leaves may be shaken and scattered about for the purpose of drying. This room might be advantageously situated above the laboratory. A cool, dark cellar, will also be useful, for keeping the leaves fresh in dry weather:—white mulberry leaves will thus keep fresh three days—the native mulberry leaves will not keep so long. The number of attendants necessary for 1,000,000 of worms will be two the first week, four the second, eight the third, and sixteen to twenty the remainder of the feeding season; one half of which may be boys and girls.

At the period for hatching, which in Maryland is generally about the 1st of May, the eggs, which are presumed to have been kept in the cellar, may be brought out, and spread on paper on a common table, called the hatching table. The proper period is always best ascertained by the state of the mulberry leaves. I

consider the best and most safe time to be that when the leaves are about the size of a half dollar. The hatching table may be kept in the common labatory. If the weather be mild and warm, the eggs will begin to hatch in eight or ten days. The first day or two there will but few leave the eggs—they need not be attended to. On the third day a considerable quantity will hatch. Some fresh leaves should then be laid on them, when they will soon attach themselves to the leaves, and should be removed on to a shelf, and thinly spread out. The next day all that have hatched should be treated in the same way; and so on till they have all hatched, which will generally be in five or six days. Each day's hatching should be placed on separate shelves, and the whole laboratory arranged into as many divisions of shelves, as there were day's hatchings, that they may be continually kept separate. This is important, that the periods of moulting and spinning may be as nearly the same with all the worms on a shelf as possible.

In large establishments a small close room, with a stove, will be very useful in hatching the eggs; as the temperature may be regulated at pleasure. But in this case a thermometer is almost indispensable, as there would be danger of too high a degree of heat, which would spoil the eggs at this season, and the necessary equability and gradual increase of temperature could not be secured without one. In this mode of hatching by artificial heat, the worms will be brought out with more regularity and in less time, than in that above described, and therefore it is preferable in large establishments. The hatching room should be, when the eggs are carried into it of about 70° temperature, which should be increased one degree a day till the worms are hatched. The hatching room will therefore be of about 80° temperature when the worms are hatched, and if the laboratory is not then about the same temperature it should be raised to it, or nearly so, before carrying in the young worms, that they may not experience too great and sudden a change.

The leaves may be torn in small pieces whilst the worms are small, and the worms should be fed during the first week, two or three times a day, by scattering the leaves over them. The second week the worms will require food three times a day; the third, fourth, and fifth, it should be given them as fast as it is either consumed or become withered. The periods of moulting are, generally, about the 7th, 13th, 19th and 24th days of their age, but these periods are materially influenced by the care and attention bestowed on the worms—some worms will begin to spin on the 25th day; while others will delay their spinning even to forty-five or fifty days, according as they are well or ill attended to. At the periods of moulting, the worms do not, and if they all

moult together, no food need be given them; but should they not be thus simultaneous in changing their skins, those which require food should be supplied, even though the others may be disturbed by it. They are about 36 hours shedding their skin.

The Italians streneously insist upon cutting the leaves *fine*, before giving them to the worms; but having tried this plan, I found an objection to it which induced me to reject. When the leaves are cut fine, the worms easily press them down, and they are lost, having become a mere carpet for the worms. I therefore, never cut the leaves after the worms are two weeks old; but for several reasons, I prefer laying on the whole leaves, and even the small branches. When laid on whole, the leaves keep fresh till consumed; especially when left upon the small twigs. The small branches have another advantage—the worms can climb, and fix upon them, over and under them, so that the same shelf will accommodate many more than when the leaves are cut fine and they are obliged to remain on a common level surface. The worms also prefer this mode, as it approaches nearer to the nature of the limbs of the tree.

Every two or three days the shelves should be well cleared of litter and excrement, to effect which the worms may be removed in the following manner:—lay on either large leaves or twigs with leaves, and as soon as the worms attach themselves to them, bear them to a clean shelf; repeat the operation till all are removed. Some lay fresh leaves on one side of the shelf, and leave the worms to go over to them, and then clear off the other side. I prefer the first plan. Very few leaves will suffice for the first ten days; a dozen, torn into small pieces will be enough for each shelf, the 1st, 2d, 3d, and 4th day; double the quantity the next two days. However, it is unnecesary to attempt estimating the quantity, as the intelligent attendant will readily discover what is necessary, and be able at all times to guard against both stinting the worms and waste of leaves. They should always have as much as they will consume and no more. Great care must be observed that the leaves be perfectly free from wet, and fresh. When they have been kept some time, the leaves begin to turn black or dark coloured, and should be thrown away. In wet weather, the leaves may be dried by taking them into a large room, spreading them out, and occasionally shaking them up.

Great care should be taken to guard against mice and ants; mice devour them with avidity, and the bite of an ant is almost instant death to the worm. Isolating the shelves from the walls and setting the feet in basins of water will protect them from ants; but the access of mice to the room must be cut off.

The success of the crop depends upon the cleanliness of the shelves, and purity of the air in the room, especially in hot, and more particularly in damp weather. If the excrement and litter

be allowed to accumulate, fermentation, and putrefaction soon commence, and the consequence will be fatal to the worms, especially in hot, damp weather; besides, the worms at all times thrive better when the shelves are kept clean, and nothing but fresh leaves allowed to remain about the worms. To guard against impurity of air, which is the greatest enemy the silkworm has, a small quantity of *chloride of lime* should always be kept in a plate in some part of the room. It is a cheap and most effectual preventive of this cause of disease in worms, as well as a powerful remedy for the *tripes*, and other diseases that have become epidemic. It is generally retailed at the drug shops at 25 cents a pound, and four pounds will be sufficient for the largest laboratory. A couple of spoonfuls may be put into a plate with about a gill of water, and should be replenished every three days.

Where proper cleanliness and due attention to ventilation are observed, there is little to be dreaded from hot weather. Nevertheless, in very hot weather all the means at hand should be availed of for the reduction of the temperature of the room; for worms will thrive best in moderate temperature. But ice, or sprinkling the floor with cold water, should never be resorted to, as has been recommended; for the vapour thus produced will do more injury than the heat. Where convenient, the laboratory should be shaded with high trees on the south side. An open, high piazza to shield the south front of the house from the sun's rays will also be of service. Opening the windows and doors, and the ventilators in the ceiling, will then be all that can be done to cool the room; and this should never be neglected, in hot weather. There is much more danger from cold than heat; and on the slightest appearance of a cold night, fire should be made in the fire places or stoves, and replenished as often as necessary. The temperature should be kept as equable as possible, and sudden changes guarded against. For this purpose a thermometer will be very useful; but the senses of the attendant will be a sufficient substitute if care be observed. I do not pretend to give the degrees of temperature most suitable for silkworms; for although we can increase the heat, it is not easy to reduce it in a large room, when the surrounding atmosphere that supplies the air circulating in it, is of a high temperature. It may be observed here, that the cool sensation felt while sitting in a current of air, is no evidence of that air or the place we sit in being of a lower temperature than the air of a room where there is no such current. The air passing over the surface of our bodies carries off heat, and thus causes the cold sensation, while at the same time the current of air, that "feels cool," is many degrees warmer than our bodies. But silkworms are not warm blooded animals, and of course they do not experience the same relief, having no excess of animal heat to be carried off. Al-

though many persons have assured me that they had lost many worms by hot weather, I am constrained to think, that the heat was not the sole cause of the loss, for I have never lost a worm that I could attirbute to that cause. Hot weather will undoubtedly cause the destruction of the whole of them, if the litter and excrement be left unremoved; and I always suspect some such want of attention in every instance of the destruction of worms by hot weather. Heat does not injure the worms in their natural state, nor will it in their state of domestication, if they are kept as free from filth as they are on their native trees. Keeping the shelves clean, the worms not too much crowded, the air in the room pure by the use of chloride of lime and ventilation, and feeding with fresh dry leaves, I consider the best and only preventives of any ill effects from hot weather.

Between the 25th and 35th days of the worm's age they will show signs of a disposition to spin. They will become somewhat of an amber colour about the joints of the body, semi-transparent, throw out fibres of silk on the leaves, and wander about. The *brush* for the cocoons should now be provided. The best and simplest that I have been able to find is the *broom-corn*. Clear it well from seeds, and cut it from the stalk close to the junction of the straws; spread out the top in imitation of a small tree, and set it on the shelf with the top pressing against the bottom of the upper shelf to hold it in its position. It may be set in rows six or eight inches apart, across the shelf, and over the top shelf an extra one may be placed for this purpose. The worms will readily find and climb these little trees and spin their cocoons in them; the worms will be four days spinning their cocoons, and they will all generally be finished on the eighth day after they first began—that is, all of the same day's hatching. The brush may then be taken down, the cocoons taken off, cleared of the loose *tow*, and prepared for reeling.

The cocoons from which eggs are expected must be spread out in a room, secure from mice and ants, and in five to ten days the moths will come out of the cocoons, when the males and females will couple; they must then be taken by the wings in pairs without separating them, and placed upon sheets of paper disposed for their reception, where they are to remain. There is generally abont an equal number of each sex. I have found the best mode for fixing the paper for the moths to lay on, as follows: stretch two pieces of strong twine across the room from wall to wall, about two feet apart, and another about a foot over the middle of these. Lay large sheets of paper (old newspapers will do) over them and pin them down at each side to the lower twine. The sheets of paper will then be in the form of the roof of a house. As many pairs of moths as can conveniently lie on the papers may be placed there. This mode has the advantage

of security against ants and mice, which are very destructive to these insects. The room should be dark, if possible, while the insects are on the papers, and each sheet should be filled before any are put upon another, and as soon as the moths on one sheet are done laying eggs, it should be taken down, folded, and put in a tin box in a cold cellar, where all the eggs must be kept till wanted for use next spring. The moths are in the form of a greyish white butterfly, and generally begin to lay eggs in 24 or 36 hours after leaving the cocoon. The eggs are at first of a pale yellow, or somewhat of a sulphur colour, but in three days turn to a light slate colour, and subsequently to a dull brownish slate colour. When seen through a microscope they are speckled. Those that remain yellow have not been fecundated, and of course are worthless. Each healthy female moth will lay about 450 eggs, generally handsomely disposed and firmly attached to the paper in a circular form, the whole covering a space about the size of a fifty cent piece.

Should the eggs be permitted to remain exposed to the warm weather, they will hatch, and, unless another crop be desired, they will be lost. This is the only injury they are liable to from warm weather. The flies eat nothing after leaving the cocoon, and die in a few days after depositing the eggs. The tin box in which the eggs are directed to be kept, is intended to protect them from mice and insects. The eggs should be kept in a dry cellar, as mould and mildew will injure them. There will be many double cocoons, those which have two or more worms in them, these and as many more of the others as are wanted should be selected for eggs. GIDEON B. SMITH.

ART. III.—*Outlines of Horticultural Chemistry:—Vegetable Physiology.* By G. W. JOHNSON, Esq. of Great Totham, Essex.

[FROM THE GARDENERS' MAGAZINE.]

(Continued from page 271.)

THE *flowers* and *seeds* are those essential parts of a plant by which it is preserved from extinction. Linnæus has compendiously designated the parts of fructification "a temporary part of vegetables, terminating the old individual and beginning the new;" a definition, however, only strictly true when applied to annuals.

The *petals* of the flower evidently act an important part in nourishing the more essential parts of fructification, since, if they are removed from plants naturally possessing them, I am not a-

ware of a single instance in which the seeds will advance a grade further towards maturity. The *stamens* and *pistils* are the most essential parts. The first are the members that secrete the pollen, or fecundating dust, without the application of which to the pistils the seed is never fertile. It is the *anther*, or summit of each stamen, that secretes this fecundating matter. * The pollen appears to be, to the unassisted vision merely, a fine powder; but, in fact, each grain is commonly a membranous bag, varying in form in different species. Pollen is chiefly discharged from the anthers during dry warm weather; but each vesicle of it remains entire until it comes in contact with moisture, when it immediately bursts, and discharges its minute particles in a form absorbable by the small ducts of the pistil. This necessary degree of moisture usually exists upon the summit of the pistils, to which the bags of pollen cling, and thus more securely determine the impregnation of the seeds. We are furnished, by a knowledge of these facts, with a reason for the great injury occasioned to orchards, &c. by excessive wet weather during the time of flowering. The pollen is washed away from the anthers as it is secreted, and, exploding at the instant, either does not settle at all upon the pistils, or alights upon them whilst loaded with unnatural moisture which is again shaken off, or is prevented entering their orifice. They warn us, also, from watering or disturbing unnecessarily the herbage of plants, under our care whilst they are in bloom. It is a fact of some importance to be known by the cultivators of hybrids and new varieties, that in dry weather pollen may be conveyed to a considerable distance uninjured. This is demonstrated by many observations on accidental impregnations by the agency of winds, &c.; and still more decidedly by Linnæus, who kept some of the pollen of the Játropha ùrens in paper for more than a month, which afterwards fertilised the pistils to which it was applied. In the present general diffusion of botanical knowledge, it seems almost trite to observe that the seed grower should neither exterminate the barren plants of the dicœcious class, as in spinach, asparagus, &c., nor remove the unfertile flowers of cucumbers, &c.; for, without these, the female blossoms would be equally unproductive. Many insects are highly injurious in the hot-house, &c., to the plants they contain; but an indiscriminate destruction is not to be recommended. Many of them bear pollen on their wings, &c., to female flowers, which otherwise would remain unimpregnated. The humblebee, above all other insects, I would have befriended, for its robust and hardy form enables it to get abroad and be employed in this useful work, when weaker insects are confined by inclement weather.

The stamens are changed into petals in double flowers, which are consequently unfertile: they are often likewise obliterated,

either by excessive nourishment, or when the plant increases much by root, as in Fiery Lily (Lílium bulbíferum) If this excessive production of root is very remarkable, it sometimes prevents the production of the flowers of the plant entirely, as is the case with some early varieties of the potatoe; for Mr. Knight demonstrated that if the tubers of such were removed as they were produced, the plants blossomed as freely as later tubering varieties; and, *vice versâ*: the removal of the blossoms of tuberous-rooted plants promotes the size and number of the tubers. It is not to be supposed, however, that fibrous rooted plants are not similarly affected. I have observed the gooseberry bush, that, after being under the shade of trees, &c., had never borne fruit during a series of years, to throw out annually a very excessive number of suckers. Again, fibrous-rooted land plants, which by accident are growing in water, increase the number of their radiculæ enormously, whilst their fructification is diminished and abortive in proportion.

Of the pistils, the two essential parts are the *stigma*, or orifice for the admission of the pollen, generally on the summit; and the *germen* which is the rudiment of the future seed-vessel. Pistils, like stamens, are obliterated in double flowers, otherwise they are not so liable to become petals.

The production of the *seed* is "the being's end and aim" of every plant: all its other parts, by ministering in some way or other to its maturity, indicate its importance. Not perceiving that a description of the various parts of the seed would lead to any practical hints to the gardener, I shall proceed to the consideration of the phenomena of *germination*.

When a seed is placed in a situation favourable for vegetation, it soon swells, its skin, or *testa*, bursts, and a shoot, denominated the *radicle*, is protruded; and, in a short time, this is followed by a second, which is named the *plumula*. The radicle by degrees sinks into the earth, and becomes a perfect root; whilst the plumula rises above the surface, to expand, and complete the form of the perfect plant. The essentials for germination are several. The first of these appears to be the perfect maturity of the seed; for, although Sennebier found that peas will sometimes vegetate, though sown in a green and soft state, yet it is certain that the plants raised from immature seed are always weak in their growth, and unproductive. Some seeds require to be sown immediately after they ripen. The Coffee bean, and the seeds of Angelica and fraxinella, refuse to germinate if not sown within five or six weeks after they have been gathered; but by far the majority of seeds retain their powers of vegetating, if carefully preserved, for years. Home sowed barley, which vegetated after being gathered 140 years. Farinaceous seeds, that is, such as contain a large proportion of starch, usually

are those which retain their vitality the longest (barley, wheat, and oats, are of this number,) inasmuch as that that constituent is very slow in decomposing. Oily seeds, and those enclosed in juicy berries, or other seed-vessels of a mucilaginous or saccharine quality, are the most liable to spoil. It is to be observed that, for the gardener, old seed is sometimes desirable; the plants from it run less luxuriantly in foliage, and produce their blossom and fruit more early than those from new seeds: hence, for melons, early and late crops of peas, &c., seed that is a year or two old is to be preferred.

No seed will germinate without oxygen gas, moisture, and a certain degree of heat are present. The requisite proportions of these vary in different individuals; but, in the total absence of any one, no seed will advance a single grade in vegetation. When all are present to a seed, carbonic acid gas is evolved, and oxygen absorbed. This gas is afforded to the seed from the atmosphere, in which we shall see hereafter it exists in the proportion of about 21 per cent. From the experiments of Saussure we learn that, weight for weight, wheat and barley, during germination, absorb less oxygen than peas; whilst these consume less than beans and kidneybeans. The first two may, therefore, be buried at a greater depth below the surface of the earth than the last three, without vegetation being prevented; for it is a want of a due supply of oxygen, at great depths from the surface, that prevents the germination of seeds so buried. Seeds that are thus situated, however, will often retain their vegetative power for an apparently unlimited period: hence earth, taken from a considerable depth, will often, when brought to the surface, be coverered with thistles, charlock, &c. In botanic gardens, plants, that were supposed to be lost to the establishments, have often been recovered by the casual digging over the borders where they had been grown; some of their seed having been buried in by a previous turning over of the soil. Seeds abounding in oil have been observed to retain their vitality the longest when so buried.

Oxygen gas is so essential to germination, that any application to seeds that affords it to them in abundance greatly accelerates the process: hence, M. Humboldt found that chlorine, which yields abundance of that gas when in contact with water, by combining with its hydrogen and setting the oxygen at liberty, produced this acceleration of vegetation. At Vienna several seeds, which were of considerable age, and had constantly refused to germinate, did so readily when treated with it. Plants raised from such seeds are undoubtedly more weak than others raised from seed in which no such extra-stimulus is required. Mr. George Sinclair, author of the excellent *Hórtus Gramíneus Woburnénsis*, however, informs me that he has employed chlorine

with singular success. He obtains it by mixing a table spoonful of muriatic acid with a similar quantity of black oxide of maganese, and half a pint of water. After allowing the mixture to remain two or three hours, the seed is to be immersed in the liquor for a similar period, and then sown. Another, and, I consider, the most eligible mode of applying the chlorine, was also suggested to me by the same distinguished horticulturist. In this way, he says, he has made tropical seeds vegetate, which refused to germinate by other modes of treatment. He placed the mixed ingredients mentioned above in a glass retort, inserting its bulb in the hot-bed, and bringing its beak under the pot in which the seeds were sown, connecting it with the draining aperture of the pot. The chlorine gas is gradually evolved, passing through the earth of the pot to the seeds, accordingly as the heat required for the different species induces.

Aghard and others have proved that seed will not germinate in any gas without a mixture of oxygen.

(To be continued.)

Art. IV.—*Preservation of Manures.*

[FROM THE COMPLETE GRAZIER.]

As manures are of such indispensable necessity to the farmer, and dung is in general so important a manure, every possible method should be taken, not only to prevent it from being wasted, but also to improve it both in quality and in quantity. In no way are manures more wasted, than by too great exposure to the sun, air, and rains; hence various expedients have been resorted to, in order to prevent this loss. Such, for instance, are the mixing of dry earth, or other absorbent substances, which certainly will, in a great measure, prevent this inconvenience; the erection of slight sheds over dung-heaps with the same intention; the covering of these heaps with turf sods (the *grassy side* being *downwards*,) when the dung is to be kept till it be old; are by no means bad practices, as the turfs will, in the course of time, be converted into excellent manure.

The farm-yard is doubtless the most proper and convenient place for forming *dung-steads*, or *dung-meers*, as the repositories for this useful article are variously termed. For middle-sized farms one will suffice: for larger farms two or more will be necessary, for the proper management of dung. According to the usual practice, a pit is dug sufficiently deep to hold the soil

which the farm may requre; and into this are thrown waste fodder, fern, straw, leaves, coarse grasses, thistles, rushes, flags, and similar aquatic plants; litter, scrapings of the yard after the rain, sweepings of the kitchen, bones, ashes, shells, woollen rags, weeds, &c. which lie there and rot, until they are wanted for use. It has, however, been suggested by the late Dr. Darwin, to dispose the heap of dung on a gently-rising eminence, with a basin beneath, for collecting the superfluous water that may ooze from the heap. We would add, that if a shady spot cannot be obtained for this purpose, a slight shed should be thrown over the dung-stead, to prevent too much exposure to the sun, air, and rain; and that gutters should be so contrived, that all the waste water and urine of the yard, oil dregs, greasy water, bloody water in which meat or fish has been washed, old useless brine, the suds and waste water of the farm-house—in short, every possible kind of liquor that may be useful—may flow through them into the reservoir, or basin, and be preserved. Dr. D. further states (in his "*Phytologia*,") that some earth, weeds, saw-dust, or other vegetable or animal excrement, should be thrown into such reservoir; which will, in consequence, promote the fermentation and putrefaction of the substances therein contained, at the same time that the draining from the dung-heap will not be dissipated.

The necessary depôts for manure being thus prepared, it will only remain for the farmer to avail himself of every possible matter, both of the vegetable and animal kingdom, for increasing and improving its quantity and quality. In addition to the various articles enumerated in the preceding paragraphs, we would observe, that before the winter or foddering season commences, the surface of the cattle-yard may be raised by spreading thereon dry swamp-mud, pond-mud, the dry scrapings of roads or ditches, and similar matters that can be procured. On this stratum may be spread a little lime, for the more speedily accelerating the decomposition of the litter, fern, and other tough vegetables that may be thrown upon it for that purpose; and, in case the season should prove too dry, the decay of the vegetable matters may be promoted by sprinkling them occasionally with water from the pump, or (which is preferable) with some of the liquor from the reservoirs at the bottom of the dung-steads. Every previous arrangement being thus made, the cattle ought to be kept within their yards throughout the winter season: where they are numerous, the surface of the yards may be removed to the dung-meers, and laid down afresh in the manner above mentioned.

With regard to the increasing the quantity of manures, agriculturists are by no means agreed as to the point of allowing litter for their beasts to lie on, or of consuming their whole stock of hay and straw, and placing the floors in such a direc-

tion, that they may be kept clean by sweeping only, so as to render litter of any sort unnecessary. The latter practice was adopted by the late eminent breeder, Mr. Bakewell, is sanctioned by many eminent farmers, and, it is obvious, must produce the largest quantity of animal manure, from the straw and coarse food being consumed by lean beasts, while the richer and more succulent is eaten by the fattening beasts, whether neat cattle, sheep, or lambs. Both practices however, may perhaps be united with advantage, where the surface of the yard can be raised in the manner abovementioned.

The augmentation of manure necessarily increases in proportion to the nature of their food. In Chap. III. pp. 132–152 of this work,* we have pointed out the various articles of the vegetable kingdom, that are best calculated for feeding and fattening cattle; and, we trust, have fully evinced the superiority of *soiling*, both as it respects the economical consumption of food, and also the production of manure. The quantity of manure, afforded by a farm, may likewise be materially increased by having *standing sheep-folds*, (*ante*, p. 168,)† and especially by adopting the Flemish practice of keeping them beneath covered folds. For this purpose, in Flanders, the ground is marked out, and spread with dry sand, four or five inches thick; on this are erected slight sheds, in which the sheep are housed at night, a small quantity of fresh sand (for which dry peat, or any of the earthy materials above stated, may be substituted) being laid on every evening. This is cleared out once a week, and carried to a dung-hill, or spread upon the soil. The manure thus produced is admirably calculated, in the opinion of M. Quintinie, for fertilizing almost every kind of ground, and in fact makes an excellent dressing for cold and stiff soils.

The most effectual method of raising a supply of manure for land, (especially in counties that are situated at a distance from the metropolis, so that they cannot be thence supplied with dung, &c.) in Mr. Middleton's opinion ("Transactions of the Society for the Encouragement of Arts, &c." vol. xvii.) consists in raising green crops for the purpose of feeding sheep, bullocks, or other animals on the land. "For," says he, "this is the only method by which the loss of nearly all their urine and dung, that unavoidably occurs under other systems of management can be prevented; as there is a great waste, perhaps of half (including dung and urine,) in the stables, cow-sheds, fold-yards, and dung-hills, even under the best management. Under ordinary management, three parts of this manure are lost; but in the soiling of tares, turnips, cole, clover, &c. in the fields, there is no loss: the whole is immediately applied, without the cost of

* Complete Grazier. † Ibid.

carriage, to the enriching of the soil."—It is obvious, however, that much of the ameliorating properties of these manures, must necessarily be lost by evaporation, and otherwise be materially diminished; so that although (as in the county of Norfolk) the soiling of sheep with turnips may be carried on with great advantage on light lands; yet, upon the fullest view we can give the subject, we are decidedly convinced that, under proper management, stall-feeding in the summer with green, and in winter with dry food, is the most effectual mode of obtaining the largest possible quantity of animal manure.

In a former part of this chapter (p. 360,) the effect of human ordure, as a manure, have been stated; and as, according to the present method of managing it, much valuable fertilizing matter is inevitably lost, it has been suggested ("Communications to the Board of Agriculture," vol i.) to form reservoirs, or pits, with floors of clay, or other material, impervious to liquid matter, as nearly as possible to the dung-heaps, and to connect such reservoirs to the privies by means of proper drains, furnishing them with covers, for the purpose of throwing in occasionally lime, peat, vegetable recrements, and other substances, that might be removed thence when they should be thoroughly impregnated and reduced to putrefaction, and be mixed with the common dung-heaps. In large towns and cities, where immense quantities of this kind of manure are annually produced, it is recommended to construct such reservoirs or basins with similar floors and drains, but upon a larger scale, so that their contents may be removed as often as necessary, during the night. Or, where large rivers flow through cities or towns, &c. reservoirs of this description might be formed on their banks, and the ordure be thence conveyed into covered boats or barges; or this manure might probably be conducted, through the medium of sluices, from the extremities of the common sewers into such barges, and be easily transported to distant places. And, as the system of canal navigation is now brought to so high a degree of perfection, the expense of carriage will be trifling indeed.

Dung-steads may be tended, and the respective manure augmented at different times, when no other business of greater moment stands in the way; and to prevent the heaps from being too much torn or spread about by the scratching of poultry, or by swine, they should be surrounded by pens, made of broad deals. In wet seasons it will be advisable to throw a slight shed over the dung-steads; and, as the heaps will not ferment so expeditiously as could be wished, it may be useful to turn them over once or twice in the course of the summer: thus they will become more thoroughly mixed and mellowed, and rendered sooner fit for use, while the seeds of weeds therein contained, will vegetate and be destroyed.

The following method of making dung-hills, as practised in Middlesex, we give from Mr Middleton's interesting Agricultural Survey of that country; and, from its judicious arrangement, it has a just claim to the attention of agriculturists.—In the first place, all the scrapings of roads, mud of ditches and ponds, and the top mould of gravel-pits, are spread in the most convenient spots, as bottoms for dung-hills; on these layers is carted all the dung produced on the farm, together with the whole of what can be obtained from London, and the various inns on the road: to which materials are occasionally added chalk, ashes, soap-boilers' waste, bricklayers' rubbish, &c. In this state the mass or heap continues till within one month of the time for manuring land; the whole is then turned and thoroughly mixed together, the larger clods being broken into small pieces, and the drier parts being thrown in the middle. In consequence of this management, the mass becomes more intimately blended, and the putrefactive process is completely finished, while the matters remain in a heap. At the same time, by this method of forming the bases of dung-hills, the fertilizing liquor which distils during the fermentation and heat that necessarily ensue, is effectually preserved, and greatly contributes to ameliorate the soil.

PART III.

MISCELLANEOUS INTELLIGENCE.

Cotton.—Two curious facts are said to have been lately ascertained at a warehouse, in Manchester. One is, that some of our Sea Island planters, whose brands are "Fancy Brands," case the inside of their bagging with bags of glazed Cotton stuff; to keep out more effectually the wet and dust. The other is, that a large number of our most noted brands with other Cottons were lying together; and, upon comparison, it was found, that the spinner preferred a bag of Santee Cotton to any of the collection, including those usually sold at extraordinary prices. This seems to confirm the opinion beginning to prevail, that the selection of seed is more necessary than situation near the sea, for the production of the finest Cottons. Let the gentlemen of Pineville look to it. P. V.

Sugar Cane.—"In the Province of Caraccas, Sub-carbonat of Potash is used instead of Lime, to purify the juice of the Sugar Cane. The ashes of the Bucare, which is the Erithrina Corallodendron, are preferred."—*Humboldt's Personal Narrative, Vol. iv. page 179, 2d Edition, London.*

Grapes—Asparagus.—In a communication made by Dr. J W. Smith, to the American Farmer, he observes, "I have paid some attention to the cultivation of the Grape, and have found from experience, that the coal dust, cinders, and scales of iron, or black oxide of iron, from the blacksmith's forge, when properly mixed with *fine garden mould*, to be *incomparably* the best manure for the grape that can be used. It is a well known fact, that grapes thrive best in volcanic districts; that led me to use the above as a dressing for the grape, and found it to exceed my most sanguine expectation.

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"For Asparagus, I have also made use of finely pulverised oyster shells, well incorporated with the earth, in which it is planted, or well dug in about the roots of old beds. Its effects are astonishing, especially on old beds—it in fact regenerates them."

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Burning the Vines of Strawberries.—A gentleman in this vicinity has this season tried the experiment of burning the vines of Strawberries as recommended by Rev Dr. Miller, in the New-England Farmer, Vol. vi. p 233. The experiment has succeeded perfectly—the vines having now a most vigorous growth, and promise of a great crop of fruit. Dr. Miller states that his vines treated this way yielded their fruit not only in a more convenient succession, but at least a third more in quantity, than others in the same soil.—*New-England Farmer.*

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Beet-Root Sugar.—Much importance is at present attached in France to the manufacture of Beet-Root Sugar. The expensive process for the manufacture of Beet-Root Sugar has till now been the cause which has kept up its price on a par with the sugar of West India growth; and to diminish this, so far as finally to make the former more marketable, so that France may one day dispense with the foreign supply of an articie of so paramount a necessity in that country, seems to engross the attention of landowners, growers, refiners, and chemists. We find in a number of the *Journal du Commerce*, an account of two experiments recently tried with this view, which have been attended with much success; and, as the particulars are rather curious, we give the substance of them. Both experiments were made at the laboratory of Mr. Charles Derosne, at Chaillot, near Paris, and in the presence of a great number of eminent chemists. The first tended to show the power of a newly-invented system of defecation, during which Mr. Derosne successively defecated two doses of beet-root juice of 600 litres each, through the agency of alum, the properties of which preclude the inconveniencies attending the use of lime, and have produced a much more complete discolouration than was obtained by all former systems. The juice defecated was so limpid and pure, that on being boiled it appeared like water, perfectly free of froth. Reduced to a thicker body, it formed itself into a syrup of the most perfect beauty, which, after the evaporation, and without the help of the stove, yielded a sugar of the finest colour.

The second experiment was meant to evince the power of evaporation in twelve hours, by a new method. By the means of 209 killogrammes of pit-coal, there were evaporated in the boilers exposed to the direct action of the fire, 1,347 litres of water in ten hours. The steam thereby produced, heated in one hour and two minutes, 600 litres of beet root juice, of which it operated the defecation; it heated besides, in another hour, the liquid which was circulated in the boilers intended to rest on the fire. In taking, for the employment of these two hours, the lesser quantity of evaporation obtained during the ten first,—that is, 128 litres of water,—the total result of the experiment is, 2,115 litres of water, or for every killogramme of

coals, a direct evaporation of 60 kil. 44., and an indirect one of 3 kil. 67.; in all, 10 kil. 11.,—a result which no system of evaporation has been hitherto known to attain.—*British Farmer's Mag.*

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Potatoes—An Irish journalist says, the following plan of raising potatoes will be found to be preferable to the present method: "Take middling sized potatoes, soak them for eight or twelve hours, according to their dry state, in water, or in the drainings of a dung heap, which will saturate the potatoes with a very rich nutritious juice, invigorating their vital principle, and enabling the potatoes to grow and exist on their own resources or natures, without depending on the rain or the moisture of the lands for support. After the land is well dug or ploughed, mark it out in rows, eighteen inches asunder, each row is to be made into a trench, in the same manner as you make trenches for cellery: each trench to be nine inches deep and twelve wide. The dirt that is removed to form the trenches to be put on them. Dig the bottom of the trench evenly, and as you dig it plant your potatoes four or five inches deep, and twelve inches apart. Place your manure in the trenches after the potatoes are planted. When the potatoes are grown six inches high pull down around them some of the earth lying on each side of the trenches; this is to be continued until the surface of the land is level. By this plan an accession of earth is made to the potatoe plants in a way most likely to be beneficial to them, allowing an uniform influx of rain water, an exclusion of the rays of the sun, and a preservation of the horizontal shoots of the plants, thereby insuring the best crop.—*British Farmer's Magazine.*

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Experiment made with Saltpetre as a Manure.—The writer vouches for the accuracy of the following experiment, having personally attended the execution of it: "In the summer of 1826, a field containing fourteen acres, about 700 feet above the level of the sea, the soil thin and stony, and tolerably dry, was fallowed and dressed with lime as a preparation for a turnip crop, which was sown in July, but in consequence of the summer proving too dry the turnips failed. In March, 1827. oats and grass seed were sown upon one furrow. and in the first week in May following five roods were marked out in a strait direction across the field, and top-dressed with saltpetre, as follows, viz:

	lbs.		*Bush.*	*Peck.*
No. 1 —	28	produce	10	1
2 —	40	do.	11	0
3 —	48	do.	12	1
4 —	56	do.	11	0
5 —	0	do.	9	1

No apparent difference was to be seen in the four roods top-dressed with salt-petre, till within about ten days of the oats coming into bell, when the blade assumed a much deeper colcur, and the straw appeared a little stronger. I shall," adds the writer, "during the ensuing summer, narrowly watch the effects of the salt-petre on the young clover."—*Ibid.*

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To obtain good Timber.—Bark the tree before it is cut down. By this means the alburnum is converted into wood.—*Loudon.* It is the sap in the alburnum, or white wood, which causes timber rapidly to decay. The sap contains saccharine matter, acids, and mucilage, which foment with heat, and bring on a decomposition of the wood. By the process recommended, the moisture is exhausted without fomentation, and the pores of the alburnum contract and harden. Soaking boards and timber in water renders the sap more thin, so that when taken out and exposed to the sun, it is more readily expelled. In the process of charring, the moisture is expelled; and not only this, but the coal [carbon] protects the timber from

moisture, air, heat, the great agents in the process of putrefaction. Charred wood is said to have been taken out of the ground at Constantinople, in a sound state, which had lain there seven hundred years.—*New Eng. Far.*

Pride of China Tree—Antidote to Fleas.—Mr. Skinner—Believing that whatever contributes to the comfort of his dog, affords pleasure and interest to the sportsman, I offer the following for your Sporting Olio:

I have for several several years observed that my old dog, who is very sagacious in other matters, has at times chosen his bed near the trunk of a *Pride of China Tree*, (Melia Azedarach,) which appeared to me much less comfortable than his most usual place of repose—in fact, the dog seemed so well aware of this, that he never continued it more than a night or two in succession; and at other times he uniformly took one place, I became a little curious about this temporary change. On mentioning it, a few days since, to a friend, while walking in my garden, he said he would not pretend to account for the conduct of the dog, but it was his own practice, when travelling in the southern part of our country, where the Melia Azedarach is very common, before going to bed in the summer, to get some of the leaves of the tree and put them under the sheet, and around the bed, to drive away the *fleas*. It at once struck me that my dog was not as much annoyed by fleas as other dogs who came to visit him; and on inquiring of my family, I cannot ascertain that fleas are known about my house, or yard, where we have several of those trees.

The Melia Azedarach grows readily from the seed, and soon becomes a very ornamental tree. With a southern exposure, it thrives well as far north as the city of Washington. The bark of the root is sometimes used as a vermifuge, and the berries or fruit, occasionally put into the food of a horse, and are said to be a good remedy for bots.—*American Farmer.*

Piney Tallow—is a vegetable product, resembling common tallow in many of its properties; it is obtained from the piney tree, Vatèria (Abraham Vater, Professor of Botany at Vittemberg in 1722) indica, by boiling the fruit in water, when the tallow is soon found to rise to the top in a melted state, and, on cooling, forms a solid cake. The colour of the tallow is generally white, but sometimes yellow; it is greasy to the touch, with some degree of waxiness; it is almost tasteless, and has an agreeable odour: it melts at a temperature of 97½°, and consequently remains solid in the climate of India. The piney Tallow is used only for medicinal purposes at Mangalore, but the tree is common throughout the western coast of the peninsula of India, at least as far northward as the boundaries of the province of Canara; and there would no doubt be sufficient to supply a considerable demand for this valuable product. The piney tallow has been made known in this country by Dr. Babington, according to whose analysis 100 parts contain carbon 77, hydrogen 12½, oxygen 10⅜=100.—*(London Mechanic's Register.)*